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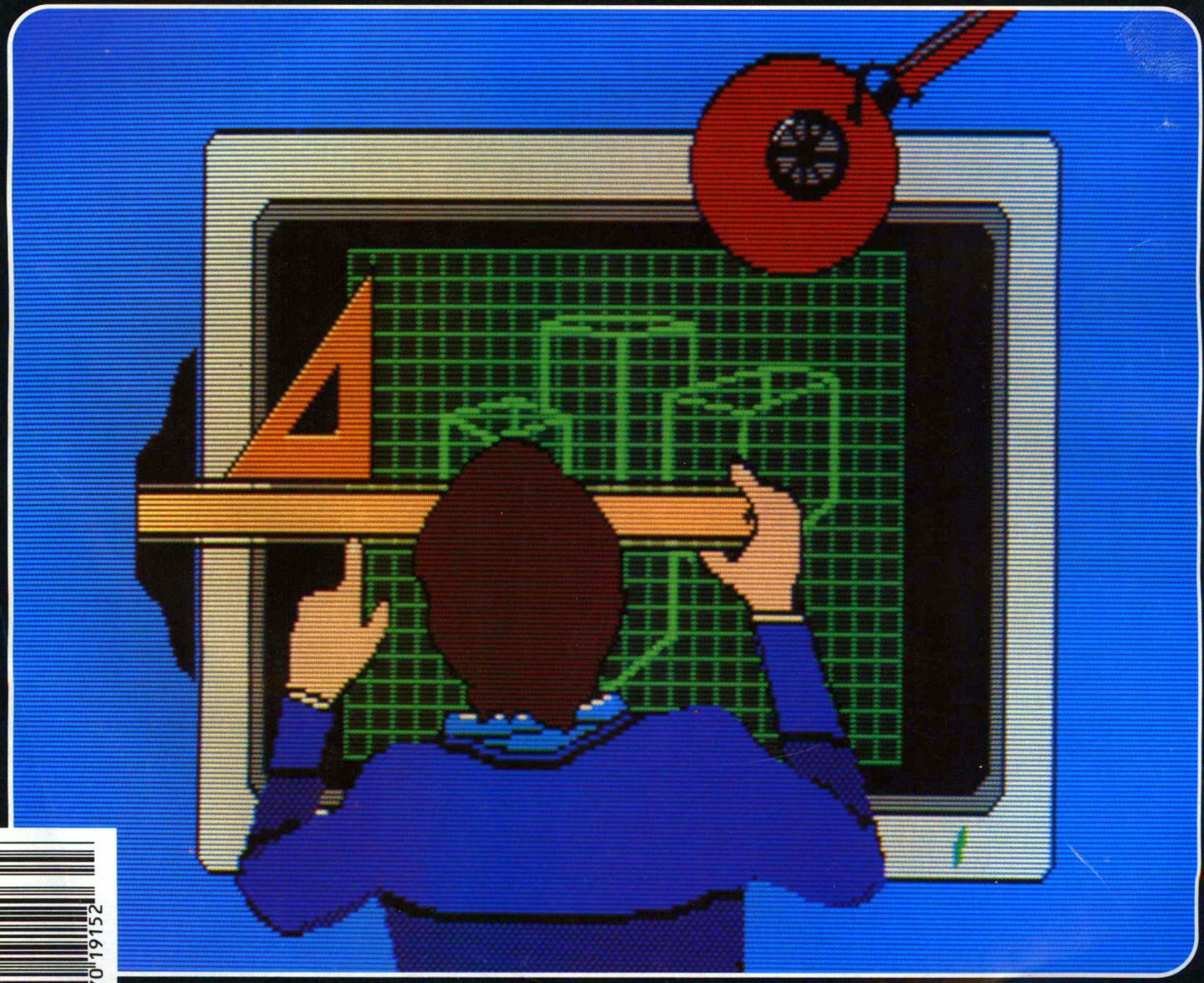
World's Largest Apple User Group Magazine

March 1987 • $3.00 U.S.

CAD on the Apple II

Comparing Three CAD Programs • A Simple Hardware Interface • Modular Assembly Language Pt. 3 • Wiretapping into BASIC • Further Adventures in Word Processing • Apple IIGS Compatibility • ProDOS Memory Management • Tracking Investments • Silicon Intelligence • A.P.P.L.E. Doctor • And more



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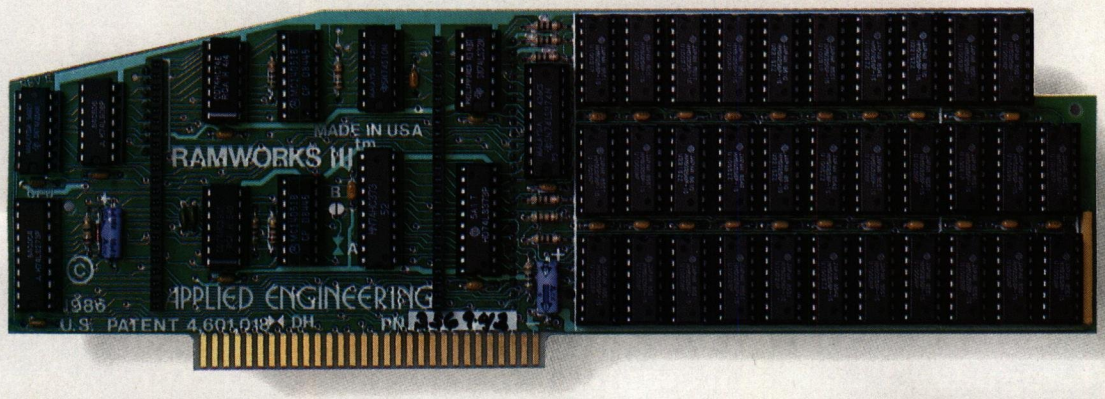
Apple PugetSound Program Library Exchange

RamWorks® III

Patented Performance from the Recognized Leader



With battery backed RAM port, RGB port, increased memory capacity, full software compatibility and more compact design, RamWorks III is a generation ahead.

RamWorks III is the newest 3rd generation RAM card for the Apple IIe. It incorporates all of the technology and improvements that years of experience and over a hundred thousand sales have given us. By selling more memory cards than anyone else and listening to our customers, we were able to design a memory card that has the ultimate in performance, quality, compatibility and ease of use. A design so advanced it's patented. We call it RamWorks III, you'll call it awesome!

The AppleWorks Amplifier.

While RamWorks III is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks III does. Naturally, you'd expect RamWorks III to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K, and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks III does. With a 256K or larger RamWorks III, *all* of AppleWorks (including printer routines) will automatically load itself into RAM dramatically increasing speed by eliminating the time required to access the program disk drive. Switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 25,000. *Only* RamWorks increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks even expands the clipboard. And auto segments large files so they can be saved on two or more disks. You can even have Pinpoint or MacroWorks and your favorite spelling checker in RAM for instant response.

RamWorks, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks III couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, Pro-Filer, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks is even compatible with software written for Apple cards. But unlike other cards, RamWorks plugs into the IIe auxiliary slot providing our super sharp 80 column text (U.S. Patent #4601081) in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

RamWorks III is compatible with all Apple IIe's, enhanced, unenhanced, American or European versions.

Highest Memory Expansion.

Applied Engineering has always offered the largest memory for the IIe and RamWorks III continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more than 1 MEG, RamWorks III has the widest selection of expander cards available. Additional 512K, 2 MEG, or 16 MEG cards just snap directly onto RamWorks III by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for up to 20 years.

It Even Corrects Mistakes.

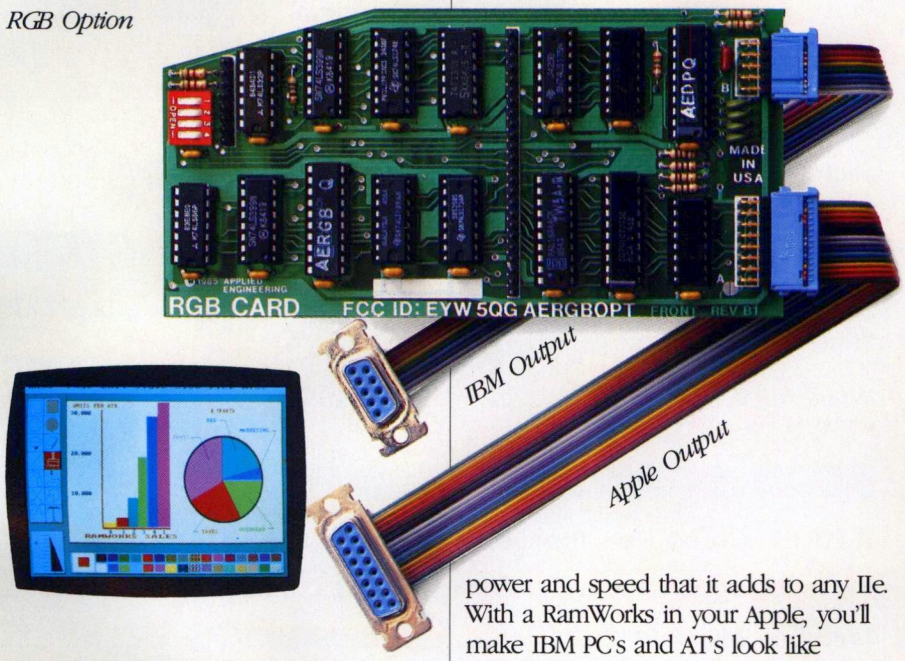
If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks III, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks and with good reason. Some others combine RGB color output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB

Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks RGB option is more than just the ultimate in color output because unlike others, it's fully compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks with no slot 1 interference and remember you can order the RGB option with your RamWorks or add it on at a later date.

RGB Option



True 65C816 16 Bit Power.

RamWorks III has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks is king of the hill."

"I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks."

Steve Wozniak, the creator of Apple Computer

Apple experts everywhere are impressed by RamWorks's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks in your Apple, you'll make IBM PC's and AT's look like slowpokes.

Quality and Support of the Industry Leader

RamWorks III is from Applied Engineering, the largest, most well supported manufacturer of Apple peripherals and the inventor of large RAM cards for the Apple. With our 5 year no hassle warranty and outstanding technical support, you're assured of the most trouble free product you can buy.

It's Got It All

- 15 day money back guarantee
- 5 year hassle free warranty
- Built-in super sharp 80 column display, (U.S. Patent #4601081)
- Expandable to 1 MEG on main card
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- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software
- RamDrive™ the ultimate disk emulation software included free
- Memory is easily partitioned allowing many programs in memory at once
- Compatible, RGB option featuring ultra high resolution color graphics and multiple text colors, with cables for both Apple and IBM type monitors
- Built-in self diagnostics software
- Lowest power consumption (U.S. Patent #4601081)
- Takes only one slot (auxiliary) even when fully expanded
- Socketed and user upgradeable
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- Much, much more!

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RGB Option	**$129**
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RamWorks III. The industry standard for memory expansion of the Apple IIe. ORDER YOUR RamWorks III TODAY. See your dealer or call (214) 241-6060, 9 a.m. to 11 p.m., 7 days, or send check or money order to Applied Engineering.

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Volume 10, Number 3 March 1987

Official Publication of **A.P.P.L.E. Co-op** "People Helping People with Personal Technology".

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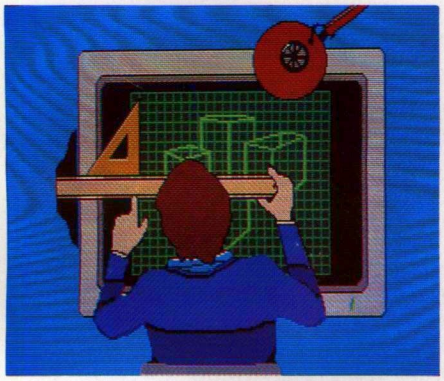

About the Cover

Today, designing and drafting can be easily accomplished on our computers. Cover illustration by Mary Hubert using a IIgs and Activision's PaintWorks Plus™, screen photographed by Ken Hennesel of Telemedia Productions.

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15 "	16.50	21.05
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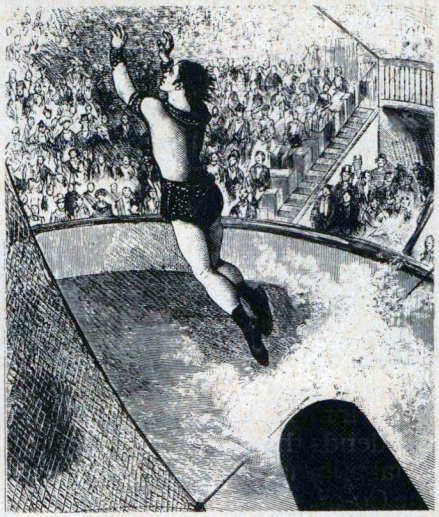

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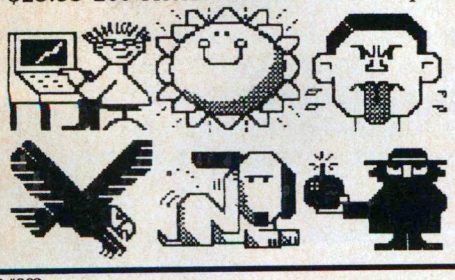

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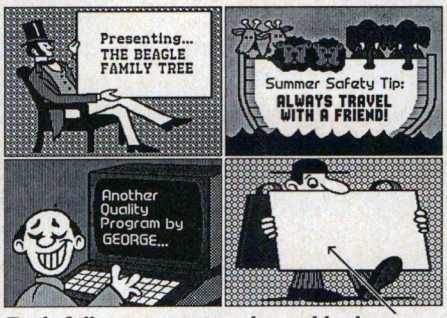

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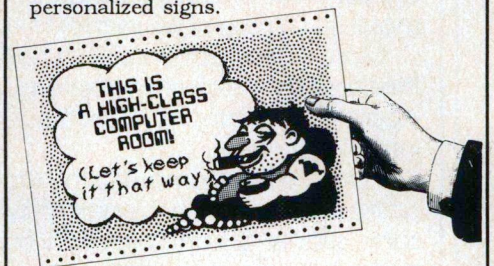

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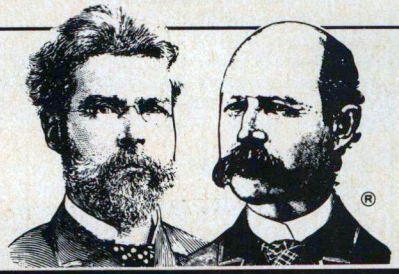

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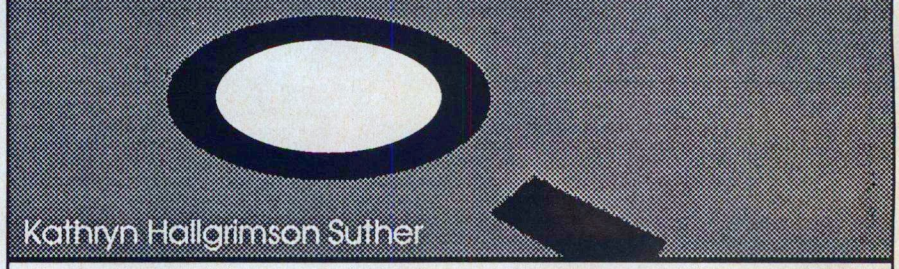

Kathryn Hallgrimson Suther

in the lead:

It's amazing what our Apple II's can do for us. Each of us use our machines for different things: word processing, accounting, programming... This month Lee Webster introduces us to another possible application, "computer aided drafting" or CAD. In this first in a series of two articles entitled, **A Comparison of Three CAD Programs**, we will take a look at two of the three products—CADDRAW and discoverCAD. Although these packages were designed for an educational setting, they may be of use to those of you in engineering, architectural and business environments.

and... close behind:

This month marks the beginning of a new, long-awaited regular column—a column to be dedicated to hardware related questions and/or topics. Peter Baum, who participated in the development of the IIe, IIc and IIGS, opens his series with **A Simple Hardware Interface to the Standard Apple II I/O Slot**. He would like reader input to help with the direction his column shall take, so please take the time to write either to Peter directly, or % Call -A.P.P.L.E.

Bob Bishop continues his Modular Assembly Language series with **The Curtain Rises**. His modules enable you to view a "curtain" effect between images on the secondary and primary screens. This method is much more interesting than simply switching screens, so have fun!

Sean Nolan's **Wiretapping into BASIC** presents a program which lets you record everything printed on the screen onto disk. With this program you can record keypresses, create a record of your work, and save listings, catalogs, or output from the monitors disassembler in a text file.

Marc Apfelstadt continues his **Further Adventures in Word Processing** by examining several word processors and AppleWorks add-ons. Watch out, there's a lot of valuable information here.

In **Apple IIGS Compatibility,** Enrico Colombini addresses some of the problems new owners may be experiencing. He gives us some simple tips and practical advice to help with your software and hardware problems.

There's lots more in this issue: **ProDOS Memory Management** by Dick Winslow (an independent approach), **Tracking Investments** by Jeffrey Jacques (another useful spreadsheet application), **Silicon Intelligence** by Michael and Lisa Storrie-Lombardi (another look at Smalltalk and the first analysis of Object Logo), **A.P.P.L.E. Doctor** , and our new products and letters section. There just has to be something for everyone in this jam-packed issue!

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March 1987

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The ballots for the annual election of officers for A.P.P.L.E. Co-op will be mailed by February 20, 1987. Fill them out as quickly as possible in order for them to be received by in time for the election. The election will be held:

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CONTINUED ON PAGE 62

Comparing Three CAD Programs

CADDRAW • discoverCAD • MATC-CAD

Lee Webster

Almost everyone is familiar with the initials CAD—but what do the initials stand for? Two (among many) possibilities are "Computer-Aided Drafting" and "Computer-Aided Design". In this two-part article, we will look at three packages that fit into the former acronym because they are suited for simple drafting. The designing still has to be done by the technician, engineer, architect, etc.

CAD has been around for a number of years, but mostly on main-frame computers or minicomputers—all for big bucks! More recently, CAD has become popular on microcomputers, with numerous packages for the IBM-PC and certainly for the Macintosh with its superb graphics capabilities. But what about the humble Apple II line of micros —any CAD for them? The answer is *yes*! We'll look at three: CADDRAW, discoverCAD, and MATC-CAD, which have a variety of features and range in cost from $60 to $395. Although designed for educational use, these packages may also be useful in an engineering, architectural or business environment.

Table 1 contains an overview of the details of these packages. While CADDRAW works on any version of the Apple II (honestly I haven't tried any of these on an Apple IIGS), the discoverCAD requires 128K systems. Although CADDRAW will work on a single disk drive system, it and the other two work best with two drives. Data entry in a CAD system can be by a variety of devices. I prefer a mouse or a graphics tablet. The tablet is more expensive, but is the only practical method if you need to trace existing drawings. Each of the three packages supports at least two input devices (including keyboard). Two types of output devices (other than the monitor) are common—dot-matrix printers and plotters. Printers are fine for draft copies, but not of sufficient quality for production copies. (Laser printing would be high quality, but isn't directly supported by any of these programs.) Pen plotters can provide excellent qual-

FIGURE 1: CADDRAW Operating Menu Screen

```
CADDRAW LIBRARY

 1   PRIMARY OPER.          4   COLOR
 2   SYMBOLS TABLE          5   SPECIAL FUNCTION
 3   CONVERSION CH.         6   COMMANDS CHART

10   CADDRAW SYSTEM        16   CATALOG FILE
11   CENTERING/BORDER
                           17   SCALE: (1 )
12   LOAD DR. PG. 1
13   " " " 2               18   COMPLEX:(YES)

14   SAVE DR. PG. 1
15   " " " 2               19   QUIT PROGRAM

        ESCAPE KEY = DRAWING MODE

FIX:   NO - FIX
                        ENTER CHOICE: #
JP=&   X=
C      Y=
```

ity output, some in multiple colors. Only CADDRAW doesn't support a popular Hewlett-Packard (HP) or Houston Instruments (HI) plotter.

The operation of each package is sufficiently different, so we'll begin by discussing them separately. We'll look at the operating environment, some details on how entities (lines, circles, arcs, etc.) are drawn, and special features. Then we'll compare the documentation for each, and finally draw (no pun intended!) conclusions.

CADDRAW

CADDRAW is a basic CAD program that operates on any Apple II and incorporates a number of standard shapes and other useful features.

Operating Environment

Following a logo screen, CADDRAW opens with a text screen divided into three main parts. (Figure 1) The top third shows a menu of the Library. The Library is a set of 6 text pages (screens) which can be displayed on the middle third of the screen. These pages include: primary operations, symbols tables, conversion chart, color, special functions, and commands chart. The lower third of the screen (actually the bottom 4 lines) is similar to the bottom of the drawing screen display (described later). There is also a place to enter your choice. You can choose another library page, or choose a menu item from a particular page. Although this may seem a bit confusing, it works fine and is an adequate way to handle the many menu selections available.

Two of the Library pages are not menus. They are handy on-line references. One is a Conversion Table which shows 8 inch-to-decimal conversions and 11 inch-to-decimal conversions. The other page, Commands Chart, is a summary of all the available commands. Back to the Primary Operations page. File maintenance commands (Load, Save, Catalog) are included here, along with Quit. In addition, there is a command which toggles complex features ON and OFF. There is also a command for choosing one of 9 available drawing scales: full, 1 1/2"=1", metric (1mm=1mm), and 1/24"-, 1/8"-, 1/4"-, 1/2"-, 3/4"-, or 1"=1'-0".

Set-up and Cursor Movement Options

Before starting a drawing, you may set up a border and have the views automatically spaced and centered. You can

TABLE 1: CAD Software Overview

ITEM	CADDRAW	discoverCAD	MATC-CAD
Version	4.0	1	4.0
Source	*Kitchen Sink Software 903 Knebworth Ct. Westerville, OH 45081 614-891-2111*	*Hearlihy & Co 714 W.Columbia P.O. Box 869 Springfield, OH 45501 1-800-622-1000*	*MATC-CAD 1015 N. 6th Street Milwaukee, WI 53203 414-278-6743*
Cost (Footnote 1)	**$60**	**$209**	**$395**
included in cost	1 disk and 2 manuals, not copy protected	2 disks & backup set, manual, copy protected	1 disk, 2 manuals, 1 yr software maint. contract,Quick Ref. card,Tablet overlay, not copy protected
Computer	Apple II,II+, IIe, IIc	Apple IIe,IIc	Apple II, II+, IIe, IIc
Memory	48K	128K	64K
Disk Drives	2	2	2
Input Devices	Keyboard,mouse, paddles,Koala pad,joystick, Koala Light Pen, Versawriter Tablet	Keyboard,mouse	Keyboard,mouse, joystick,Kurta Graphics Tablet (Apple Tablet also supported)
Printers	Requires separate software (Footnote 2)	Requires separate software (Footnote 2)	Epson MX-100,80 w/Graftrax,FX-80 FX-100;Panasonic KX P1090 & P1091
Plotters	None	HP-7470 & 7475 HI-PC695,40 & 41, Apple Color	HP-7470A & 7475A HI-40,41, & 51
Operating System	BASIC,DOS 3.3	Pascal	Pascal

Footnote 1:

CADDRAW	$5/copy site license available
discoverCAD	3 pak $375 ($125/workstation) 5 pak $499 ($99/workstation) 10 pak $799 ($79.90/workstation) 20 pak $1199 ($59.95/workstation)
MATC-CAD	$195 package without software maintenance or instructional materials. 4 pack $695 ($174/workstation) with software maint. 12 pack $1495 ($125/workstation) w/software maint.

Footnote 2:

"Triple Dump"	Beagle Bros. (3990 Old Town Ave., San Diego,CA 92110, 1-800-345-1750, $39.95) recommended by both CADDRAW and discoverCAD packages

select to draw on page 1 or 2. For larger drawings you can extend your drawing to both pages. There is even a way to scroll between the two pages—a clever feature.

Next, you can select to have no border, or one of 4 pre-set borders (different title block positions). Three of the options are shown in Figures 2, 3 and 4. For centering, you select from 8 choices of orthographic view combinations (e.g. front, top, right side; or top and front only, etc.). You can also decide to have no centering. You are then prompted to enter the height, width, depth of the object you are going to draw. This information, along with the scale, and your choice of spacing between views, allows the computer to calculate the positioning of the views. The program then draws a rectangle (or corners only) to show the position of each view you're going to use. This is a handy feature that helps you get the spacing right!

Cursor movement is accomplished by any one of several ways. The one requiring no additional expense is the keyboard—the arrow keys do the job. With an Apple II+ you toggle the arrows to up/down action with a Z command. Cursor movement occurs at any one of three "speeds"—1, 6, or 24 pixels at a time. Pressing RETURN changes the speed. It doesn't take long to get the idea of using the 24 speed to get in the vicinity of your position, then 6 to slow down, and finally 1 to get to precisely where you want to be.

CADDRAW can also be configured for other input devices (Table 1). With most of these, you still need to use the keyboard to complete some commands, but positioning the cursor is easier. I tried the joystick which is OK (but the grid and snap discussed later are a real help), and the Apple mouse which worked very well.

There are three modes of operation when drawing: plot mode, text mode, and symbol mode. We'll look at all three. Table 2 contains a summary of CADDRAW commands.

FIGURE 2

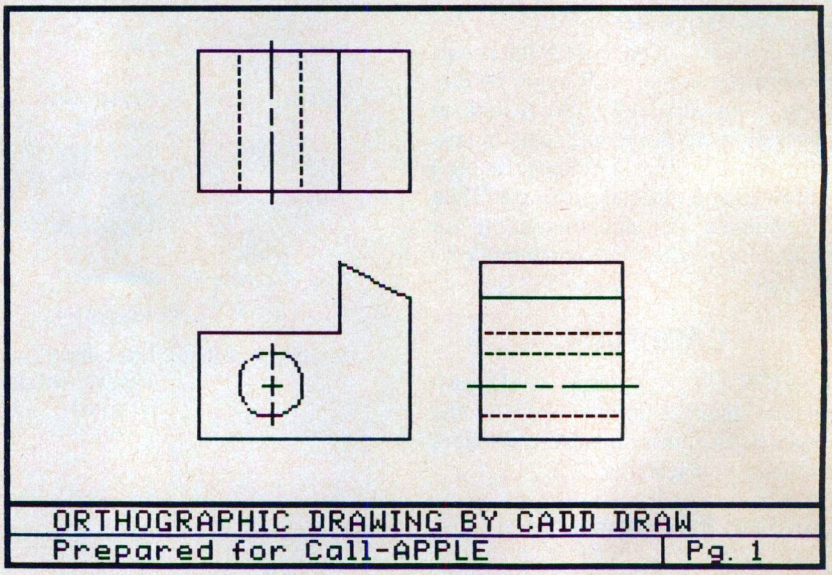
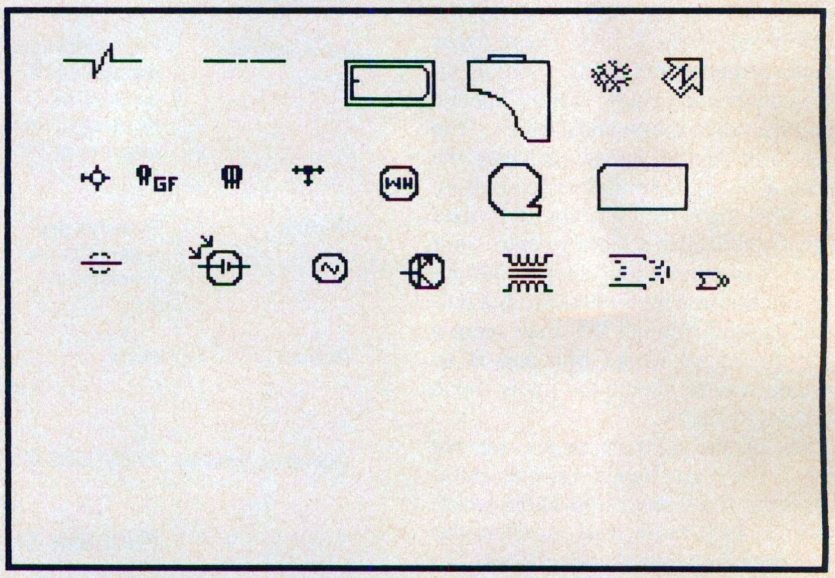


FIGURE 3



Plot Mode

In Plot Mode you can draw lines, circles, arcs, ellipses and polygons. The cursor is marked by a large flashing plus sign, with a flashing set of cross-hairs extending to the edges of the screen. Positioning the cursor is easy with this display although the flashing can get annoying. The bottom of the screen contains a text display of useful information (which can be toggled off so you can draw on the full screen). Included in the 4-line display at the bottom (same as Figure 2) are: X and Y axis positions (which can be reset so you can measure a distance from a previous position), indication of cursor movement speed, reminder that C will bring the Command Summary screen up, and indicators concerning the line weight, line type, and whether you have X or Y positions fixed (helpful for getting precisely vertical or horizontal lines). Line weight is adjustable from 1 to 9 pixels wide. Line type is a code system which allows control of the sequence of ON and OFF pixels in a line—you can generate most any line pattern that way. For solid or hidden (broken) lines, the pattern is predefined and accessible with a simple command. It would be nice, for engineering drawings, if there was also a predefined command for the centerline pattern.

To draw a line, you position the cursor at the point where you want the line to start, then press P which sets that point (with a small + symbol). You then move to where you want the other end to be and press the Space Bar—the line is drawn. This takes some getting used to—the Space Bar is not the most natural key to use to activate a command! Polygons are handled with a sep-

FIGURE 4

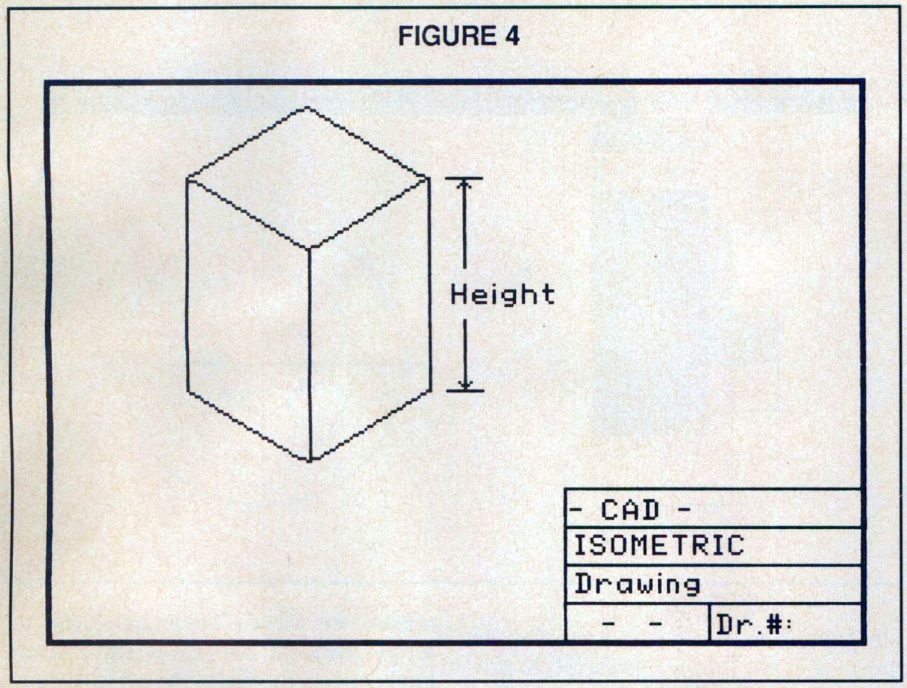


TABLE 2: CADDRAW Command Summary

PLOT MODE Commands:	SYMBOL MODE Commands:	TEXT MODE Commands:
Arc	Rotate Symbol	Begin Writing
Box	Sketch	Rotate Direction
Hidden Line	Symbol number	End writing
Sketch	Magnification	Lower Case
Point set	Work with symbol	Upper Case
Solid Line		
Vertical movement		
Weight of line		

Commands available in all three (3) modes:

Commands summary	Scroll down
Drawing pg. 2 view	Scroll up
Erase	Scroll left
Full screendrawing	Scroll right
Sketch draw	Clear screen
Measure reset to zero	Move cursor
No fixed axis	Change cursor jump increment
Plot mode	Draw entity
Quit keyboard movement	Go to library
Symbol mode	
Text mode	
Un-sketch	
Fix X axis position	
Fix Y axis position	
Toggle for left/right arrow keys	

arate command. You locate the center, then the radius. The polygon will be drawn within an imaginary circle of this radius. You specify the number of sides for the polygon. This method is not as easy as some systems (like MousePaint, for example), but it works. Some care is needed to get the orientation of the polygon correct, however. For arcs, you again locate the center, then the beginning of the arc (which defines the radius too). You then locate the end of the arc. To get a complete circle, the end point must be one pixel counter-clockwise from the beginning. Not that convenient, but there are circles in the symbols tables (described below) that are often more convenient. Ellipses, oriented vertically or horizontally are also possible in this drawing mode by specifying an appropriate aspect ratio. A simple orthographic drawing using these features is shown in Figure 2.

Erasing is cumbersome, as you erase only the plotted area under the cursor. To erase a line, you position the cursor on one end, set point, move to the other end and press E. It's sometimes tough to get lined up correctly to erase diagonal lines! To erase larger areas, it is suggested that you draw over with a black shape.

Text Mode

The text fonts used by CADDRAW are from Beagle Bros. When entering text, the cursor changes to a small open rectangle with an arrow inside. The arrow points to the direction the text will go. You can rotate text to go left to right, top to bottom, bottom to top. Upper/lower case is available (using a CTRL toggle on the Apple II+). There is no Insert or Delete, however, so editing is difficult.

Erasure is by the E command which erases the character under the cursor (but doesn't pull back letters from the right to fill the gap).

Symbol Mode

In this mode you have access to a wide variety of symbols. For example, there are symbol tables for: standard objects, architectural (2 scales), furniture (2 scales), typical sections, electrical, plumbing, arc/ellipses, electronic, flow charts, railroads, and space add your own (created with a separate program available from the publisher). Since some of the tables have as many as 30 or 40 symbols, there is a wide variety of these pre-defined shapes. Figure 3 shows some of the available symbols.

You can have only one table on-line at a time, but it is easy, by the main menu, to get another table. You select the symbol you want by number (the manual has pictures of them all). You may also have 10 of your favorite symbols set so that you need only press a single key to access them—these are identified (albeit only by number) in the bottom of the screen display.

Once you have accessed a symbol, you can also rotate it (0, 90, 180 degrees (some at 45 degree increments, but this doesn't always work right). You can even magnify the shapes from 1 to 5 times. Naturally, some shapes rapidly lose their "shape" when magnified too much. The symbol can be moved around by cursor control, then set in place (by the Space Bar again).

Special Features

There are a number of other features which are useful under certain circum-

stances, for example:

Quick Save:

You enter the name of the file once, then subsequent saves are by a simple command and each saved file has a numeric extension automatically added (.1, .2, etc.).

Move Drawings:

You can move a drawing from page 1 to 2 or vice versa.

Layer Pages:

You can have one page of the drawing flicker in the background while drawing on the other page.

Grid & Snap:

You can have a grid displayed on screen to help you line things up, and you can activate Snap which makes the input device automatically jump to the nearest grid point. I found this particularly useful when using the joystick for input.

Mirror Full & Left:

When you mirror Full, the picture is swapped left for right. When you mirror Left, you draw the left side, and it gives you the right. Caution! Mirror functions take nearly a 1/2 hr to complete!

Rubber Band:

Gives a lo-res line between cursors when drawing lines so you can see where it is going—a little like MousePaint.

Preview Lines:

When drawing lines (arcs, circles, boxes too) you get a prompt when finished to ask if you want to keep it or not. This slows down the drawing process as you have to respond each time, but you might find it better than trying to erase mistakes with the cumbersome Erase Command.

Format:

Allows you to store in a disk file, a set of default settings (like scale, input device type, number of disk drives, preset symbol table, etc.).

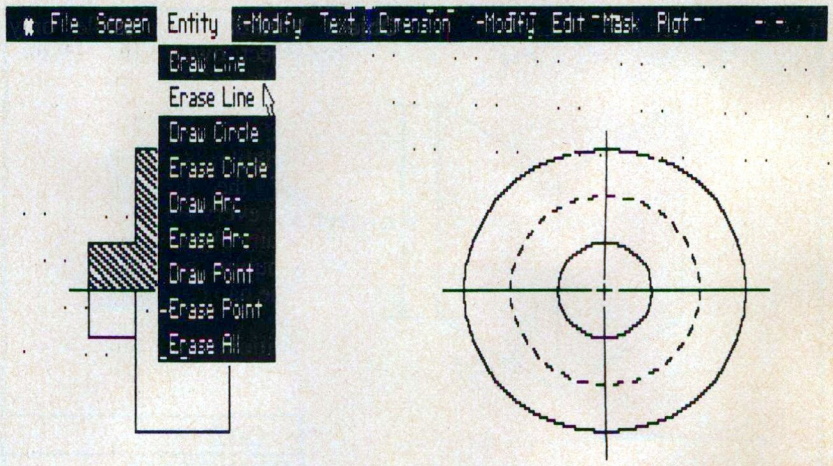
Isometric drawings:

As illustrated in Figure 4, isometric drawings are possible. A Centering/Borders option sets it up, and other commands aid in drawing along the isometric axes.

Printing

There is no printing capability built into CADDRAW so you need to have a separate printing program. Drawing files are in standard format, so it is not a difficult process, although it does take separate steps outside the CADDRAW program. The vendor recommends "Triple Dump" from Beagle Bros. for the most "accurate" drawings (scale & proportion). The CADDRAW manual lists printer models which, with the right printing program and scale selection, can produce true scale drawings.

FIGURE 5



discoverCAD

DiscoverCAD is an easy to learn package, due to its operating environment, and provides automatic dimensioning and plotter output.

Operating Environment

The screen layout of discoverCAD is similar to the Macintosh, with a Menu Bar at the top and the drawing screen below (Figure 5). The mouse can be used to move the arrow cursor to a command in the Menu Bar. Click the button on the command and a "pull-down" menu appears. Drag the mouse down to highlight the subcommand of your choice, then release the button to select. For some commands you also need to enter data from the keyboard in response to a prompt at the bottom of the screen. This method of operation is quite simple to learn, with the only catch being that you must be sure the CAPS LOCK key is down. Executing each command does cause a few seconds of disk access but otherwise the speed is acceptable. Some users might like optional keyboard commands (using Open-Apple plus another key) such as on the Macintosh.

It is possible to use the keyboard for moving the cursor and selecting from the Menu Bar and pull-down menus, but it is a little complicated. For example, you hold down both the open-Apple and closed-Apple key (wait for a beep), release the closed-Apple only, use the arrow keys on the lower right of the keyboard to position the cursor, press the closed-Apple again (works like the mouse button) and keep it down while using the arrow keys to scroll down the pull-down menu, then release the closed-Apple to select. Got that? Sure is an incentive to get and use a mouse! Let's look at some of the details. A summary of discoverCAD commands is shown in Table 3.

Utilities andScreen Control

The FILE Menu Bar selection allows you to format a disk, obtain a directory (catalog of disk contents), save a drawing to disk, or edit (retrieve) a drawing from disk. For each of these commands, you must insert your data disk in Drive 1 and respond to the prompts. The only unusual aspect is that after entering file names for save or edit, you terminate with CONTROL-Q rather than the intuitive RETURN key.

With the SCREEN control selection you can set up a grid which is drawn on the screen (slowly if you choose a small grid spacing). You can also have your drawing Snap to the grid. Up to 128 layers can be used for drawing, with control over which layer is to be displayed or erased (temporarily). Zoom IN gets a magnified view, and Zoom OUT a "wide-angle" view at a magnification (or demagnification) of your choice. You can also just hit RETURN and get a double zoom IN or a half-size zoom OUT without entering a value. Panning and redrawing are also available. Setting grids can slow zooming and panning. For example with a simple object on the screen, zoom in of 3 and grid of 0.1, took 70 secs. Panning took 92 secs.

TABLE 3: discoverCAD Command Summary

FILE	SCREEN	ENTITY	<-MODIFY	TEXT & DIMENSION
Format	Draw Grid	Draw Line	None	Draw Linear Dim
Directory	Snap Grid	Erase Line	Hidden	Erase Linear Dim
Save	Use Layer	Draw Circle	Vertical	Draw Radial Dim
Edit	Draw Layer	Erase Circle	Horizontal	Erase Radial Dim
	Erase Layer	Draw Arc	Parallel	Draw Text
	Zoom In	Erase Arc	Perpendicular	Erase Text
	Zoom Out	Draw Point	Angle	Erase All
	Zoom Origin	Erase Point	Radius	
	Pan	Erase All	Diameter	
	Redraw		Intersect	

<-MODIFY	EDIT	MASK	PLOT
None	Trim Line	Window	Plotter
Precision	Trim Circle	End	HI PC695
Alternate Text	Trim Arc	Origin	HI DMP40
Vertical	Move Copy	Absolute	HI DMP41
Horizontal	Mirror Copy	Polar	HP 7470
Point to Point	Rotate Copy		HP 7475
Height	Measure Angle		Pen Number
Width	Measure Dist.		Dim Scale
Slant			Printer
Angle			
Left Justify			
Center Justify			
Right Justify			

Drawing Entities

Lines:

To draw a line, you move the mouse to one end, click, move to the other end, click again and voila! As the DRAW LINE command stays until you select another command, you can easily continue with polygons or other connected straight-line objects. The only difficult part is learning exactly where on the arrow cursor you are pointing (using the grid and snap or zooming IN can aid this, along with some "Masks" described later). There are modifiers available for line drawing, including: vertical (holds line vertically), horizontal, parallel, perpendicular and angle (the last three all relative to another line). Angle lines can be touchy as you learn where to click on the existing line and where to point for the start and end of the new line as it governs where the angle line is drawn.

Circles:

Circles can be drawn by defining three points, or by using modifiers "radius" or "diameter". With these modifiers, you may enter a numerical value to define the radius or diameter, or use

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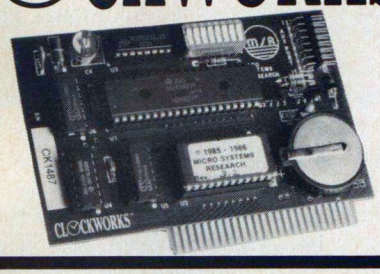

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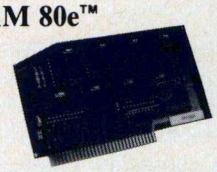

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the mouse to point to the end of the radius or diameter. Some confusion may arise because when you enter a radius or diameter value from the keyboard, the first click of the mouse locates the circle's center. If, however, you are defining the circle by using the mouse to point to each end of the diameter, the first click locates a diameter end, not the center.

Arcs:

Arcs are drawn by three points, or by radius and diameter modifiers in a fashion similar to circles. Of course, with arcs, you also have to identify the starting and ending point of the arc.

Points:

Points show as a small + sign on the drawing, and can be located anywhere. A useful modifier for this command lets the computer locate the intersection of any two (non-parallel) lines.

Erasing:

Clicking on a line, circle, arc, or point quickly erases it. You can also erase the whole drawing (an extra prompt lets you change your mind if you don't mean to erase it).

Finally, there is a Hidden modifier which works for lines, arcs and circles so you can draw either solid lines or hidden (broken or dashed) lines. These modifiers, by the way, are located in a separate pull-down menu just to the right of the entity drawing menu. You need to select from each menu. Some of the modifiers have a check mark placed in front of them when selected (hidden, and grid and snap in the screen menu for example) but not all. I think it would be useful for more of these selections to be so marked so that you know what mode you are currently operating in.

Text and Dimensions

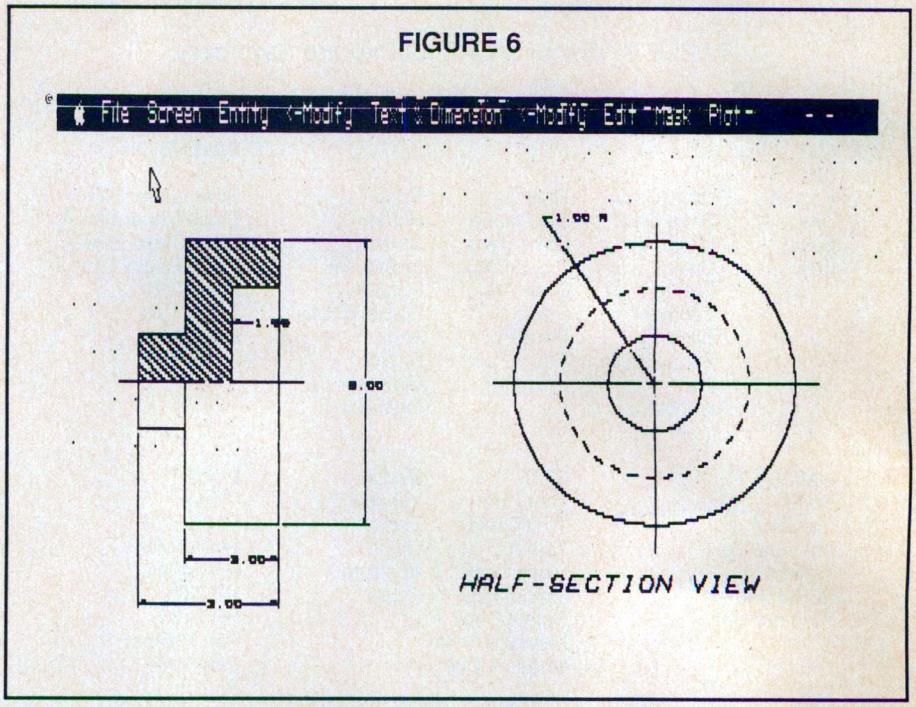
Before talking about these commands, one hint is to do text and dimensions on a separate layer or layers of a drawing. This makes it easier to edit, possibly plot with different pen colors or widths, etc.

DiscoverCAD does the dimensioning automatically, using "units" which you can define as any unit of measurement you want in your title block. Extension lines, dimension lines, arrowheads, and dimension values are done for you (under your control!).

Linear dimensions:

These can be placed on any straight-line element of a drawing by clicking near the ends of the line and clicking to show where you want the dimension

FIGURE 6



line (the line parallel to the line being dimensioned, which is broken for the dimension value). Modifiers allow you to select the precision of the dimension value (0,1,2,3,or 4 decimal places), insert alternate text (your note instead of the dimension value), or specify vertical, horizontal, or point-to-point (parallel to an inclined line) dimensioning.

Radial dimensions:

Circles and arcs are dimensioned by radius with a leader line, arrowhead and dimension value followed by letter "R", as shown in Figure 6. There is, however, no way to automatically do diameter dimensioning—except by drawing extension lines yourself and using the horizontal or vertical linear dimensioning to get dimension line and value in (but it is a little sloppy).

Text:

Text messages (up to 80 characters, all upper case) can be entered. Again, you terminate your text input with CONTROL-Q. Modifiers allow you to set height, width, slant (-45 to +45 degrees from vertical), angle (0-359 degrees to rotate text line in a position other than horizontal), and left-, center- or right-justified. The justification isn't for a series of lines, but simply that, for example, your right-justified text line will END at your cursor position. Erasing linear, radial, or text is by simple command.

Editing

Trimming:

Lines, circles, and arcs can be trimmed with appropriate commands. Lines can be extended or shortened. Circles can be reduced to arcs. Arcs can be shortened as well. Arc trimming can even be applied to a previously defined circle which has been trimmed to an arc.

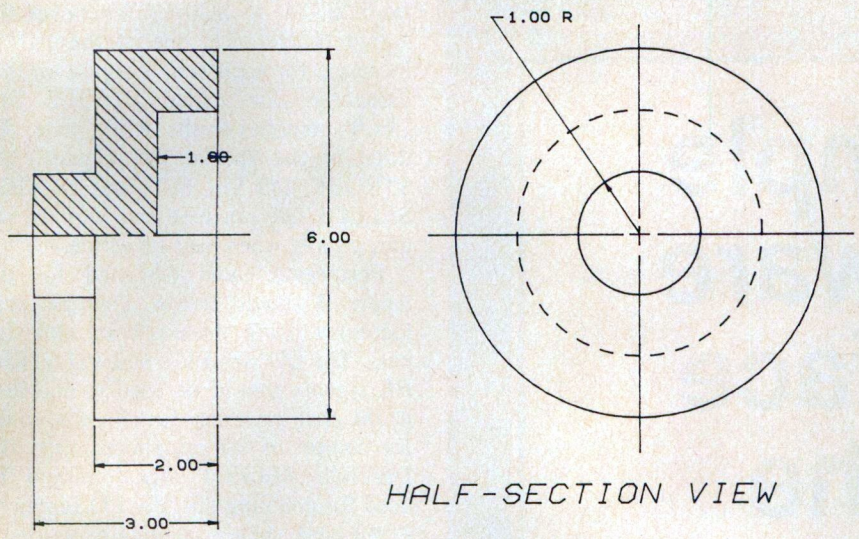
Copying:

Objects can be copied while retaining the original object. The process involves clicking on the object, then again for current position, then on the new position. Additional prompts on the screen would make the process simpler for the first time user. A straight "move" command is not available, since this "move copy" requires a separate step to erase the original object if you don't want it. Mirror copies can be made as well as copies that are rotated from the original. Again, if you don't want the original, it must be erased separately. The Rotate command does have flexibility and is a useful command.

Measuring

Angles and distances can be measured by the program. When measuring an angle, both the acute (<90 degree) and obtuse angle from the horizontal are given to two-decimal place precision. Unfortunately, there seems to be a bug in the program. I drew a line at 45 degrees from a horizontal line (using Draw Line with Angle modifier), then asked for the measurement. It gave the acute angle correctly as 45 degrees, but gave the obtuse angle as 134.1 degrees (the two angles *should* add to 180 degrees!). I tried checking a horizontal line-

FIGURE 7



the answer was correct at 0 degrees and 180 degrees. A vertical line, however, gave incorrect results of 89.1 degrees (for the acute) and 90 degrees (for the obtuse).

The distance between two points is calculated by the program after you click on the two locations.

Masks

Masks allow you to combine entities or to assure that lines are located where you want them. By using the Window command to modify the Move Copy, Mirror Copy or Rotate Copy commands, you can group two or more entities. When you use Window, you identify the upper left and lower right corner of a box enclosing the entities you want to group. Then when you move, mirror, or rotate copy, the whole group goes. Unfortunately, the enclosing box remains, and a Redraw command is needed to eliminate it.

Using the End command on a line locates the end of a line for use in drawing additional lines. This is great for getting the exact intersection and match up of points. It can also be used with circles (where the end is defined at 0 degrees—due East) and can be used to get you a line tangent to that circle at one point

The Origin command locates the center of a line, or the center of a circle for use in additional drawing activities.

Coordinates

In some instances, use of the mouse is not the best way to get a particular entity located or sized. You do have the option of using X and Y coordinates or polar coordinates. The process is a bit awkward, however. For example, to draw a line using Cartesian coordinates, the sequence involves: choosing Draw Line command, choosing Mask Absolute command, clicking mouse anywhere on screen, entering the X-coordinate from the keyboard in response to the prompt, entering the Y-coordinate, choosing Mask Absolute command again, clicking mouse anywhere, entering X and then entering Y-coordinate. You can use the mouse to select one point, coordinates for the other for the Draw Line command if you wish.

Printing

You have to get the screen display as you want it and get the arrow cursor out of the way so it doesn't interfere with the printout before you can print. You then need a separate screen dump program to get the output. DiscoverCAD recommends Triple-Dump by Beagle Bros. Printing involves removing the discoverCAD disks, inserting the DOS 3.3 version of Triple Dump, and pressing CONTROL-RESET to boot the Triple-dump program. In Triple Dump you need to specify Double hi-res type, crop the picture to eliminate the Menu Bar, and of course set up for the proper printer and interface card. The output in Figure 6 was done on an Epson FX-80 with the Grappler + interface. In some instances you may wish to have the dimension value text with a different scale-larger so it is easier to read, which was done for this figure. Not mentioned in the discoverCAD manual is that normal/inverse, rotation, and scaling options need to be experimented with to get a decent looking output. For this figure, I used the negative option, X=1 and Y=2 magnification, and 90-degree rotation. Printout took 2 minutes 52 seconds.

Plotting

Again, you need to get the screen image exactly as you want it with the use of zooming and panning—the plot will be only what is on the screen. You then "turn on" the plotter, and select the plotter model (specifying paper size where appropriate). You select the Redraw command (and specify the pen number if appropriate). Away the plotter goes (if all the DIP switches and cables are correct!). See Figure 7. This plot was done on a Hewlett-Packard 7470A plotter and took 2 minutes 20 seconds.

What's to Come

So far, we have looked at two of the three Apple II CAD programs: CADDRAW and discoverCAD. These are essentially menu-driven packages with a variety of drafting features, but distinctly different operating modes. In Part 2 we'll look closely at MATC-CAD, a command-driven program which simulates a mini-computer CAD system. We'll also compare the documentation of all three programs, provide a comparison table of the feature of each program, and summarize our conclusions.

For further information on:

Triple Dump
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CADDRAW:
CIRCLE **25** ON READER SERVICE CARD

discoverCAD
CIRCLE **26** ON READER SERVICE CARD

Please rate this article on the Reader Service Card by circling:

51 Excellent **52** Good
53 Fair **54** Poor

A Simple Hardware Interface to the Standard Apple II I/O Slot

Peter Baum

While designing peripheral cards for the Apple II, we encountered a few problems whose origins weren't immediately obvious. We solved these problems using some techniques that we will share with you. We've also included some simple design 'tricks' that should ensure better reliability for your Apple II peripheral card designs.

This article uses an example of a simple hardware interface for a peripheral card that plugs into an Apple II slot. It describes a circuit which follows all of the hardware protocols for a peripheral card. We're assuming that you have some knowledge of how the Apple II slot structure and protocol works. A quick summary follows, but for an in-depth explanation you should read the *Apple IIe Reference Manual.*

The Apple II memory map contains three different memory areas dedicated to slot I/O. Each slot has two specific areas reserved for it, while every slot can access the third memory area. This shared memory area is called the expansion ROM space or the $C800 space. It consists of a 2K chunk of memory that starts at location $C800. A specific signal on the bus, called I/O STROBE, is active whenever the 6502 accesses an address in the range from $C800-$CFFF.

The two specific memory areas dedicated to each slot are a page (256 bytes) of memory, and a smaller 16-byte piece. The page of memory, called the peripheral card ROM space, is in the address range of $Cn00 to $CnFF where n is the slot number. Whenever a memory reference in this range is made a specific signal, called I/O SELECT, is activated for the appropriate slot. The 16-byte piece of memory for each slot resides in the address range $C0s0, where s is the slot number plus 8. For example, slot 1 has exclusive use of the 16 addresses from $C090 to $C09F. Whenever the Apple II addresses one of the 16 I/O locations for each slot, a signal on that particular slot, called DEVICE SELECT, switches to the active state. All three of the special slot signals, I/O STROBE, I/O SELECT, and DEVICE SELECT, are negative true signals, i.e. they go low when they are active.

Peripheral cards designed for the Apple II should follow a simple protocol for using these special slot signals. The I/O SELECT and I/O STROBE signals should be used to enable a ROM that contains firmware routines for control of the peripheral card. The DEVICE SELECT signal should be used for enabling specific I/O functions of the card, such as reading or writing a control register.

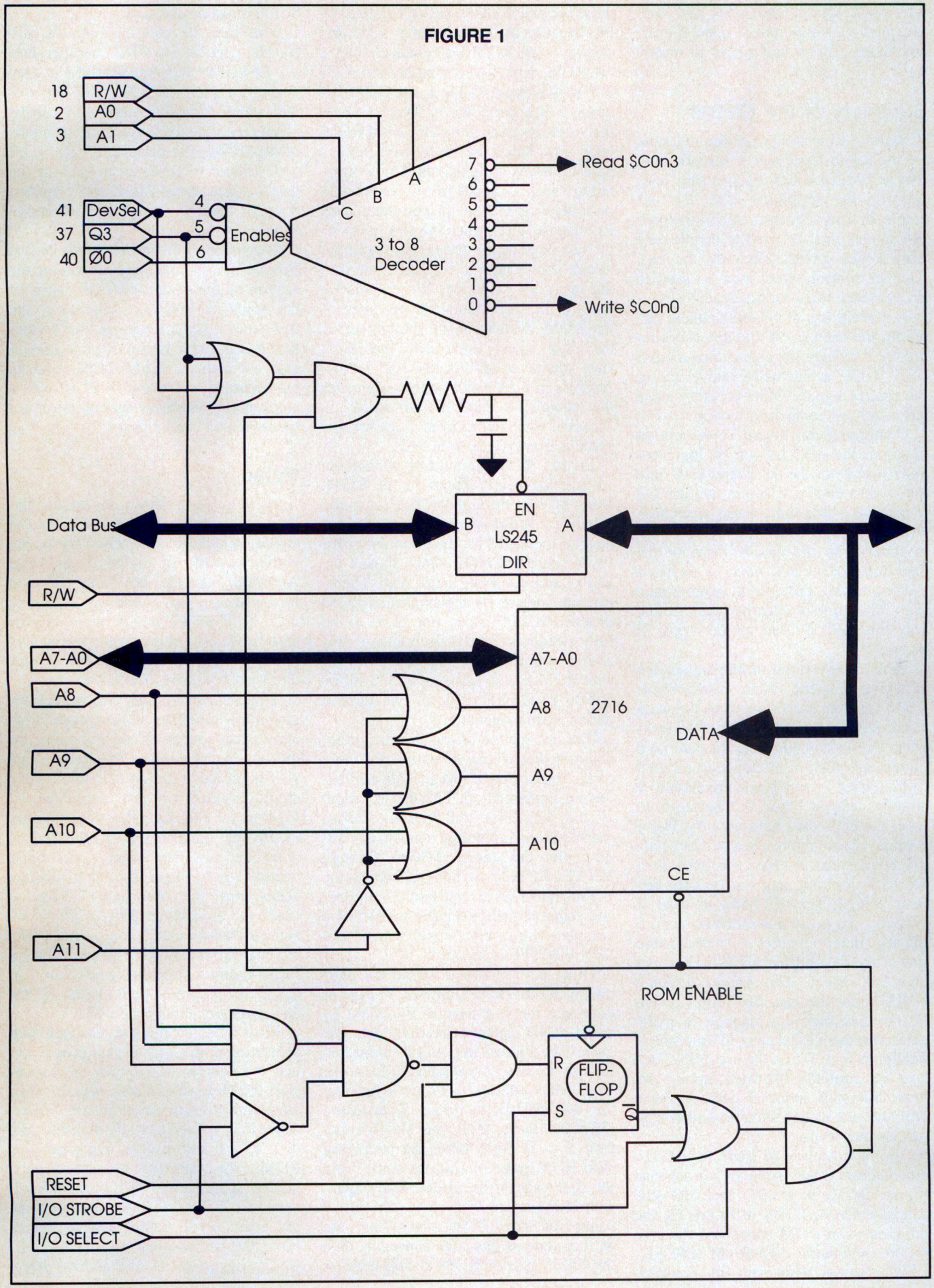
Since each card can have its own expansion ROM, there must be some means to determine which ROM is enabled. A combination hardware/firmware protocol was devised to arbitrate which peripheral card's $C800 space is enabled when the I/O STROBE signal is active. This protocol, when followed properly, guarantees that one peripheral card will have exclusive use of the expansion ROM space.

Hardware on each peripheral card disables its expansion ROM on any access to address $CFFF. Hardware on each peripheral card enables its expansion ROM on any access to its own peripheral card ROM space (determined by the I/O SELECT line on each card).

Firmware must reference address $CFFF before an access is made into the expansion ROM space from $C800-$CFFE. This acts as a reset signal to all peripheral cards so that they release control of the $C800 space. Thereafter, any card that has its I/O SELECT signal enabled gains control of the expansion ROM space. A typical peripheral card implements this by including a routine, which resides in the $Cn00 (I/O SELECT) ROM space, that reads $CFFF before jumping into any expansion ROM routines. Although this instruction disables all peripheral cards' expansion ROMs, including its own, the next instruction automatically reenables only its own expansion ROM circuit because it is fetched using its I/O SELECT signal. This gives the peripheral card exclusive use of the expansion ROM space.

Figure 1 shows a circuit which provides support for all of the protocols

FIGURE 1


18 R/W
2 A0
3 A1
41 DevSel
37 Q3
40 Ø0
4
5
6
Enables
A
B
C
3 to 8
Decoder
7
6
5
4
3
2
1
0
Read $C0n3
Write $C0n0
Data Bus
B
EN
LS245
DIR
A
R/W
A7-A0
A8
A9
A10
A11
A7-A0
A8
2716
A9
A10
CE
DATA
ROM ENABLE
R
FLIP-
FLOP
S
RESET
I/O STROBE
I/O SELECT

mentioned above. The gates and flip-flop pictured are generic to make the circuit more general and easier to understand.

Summary of the Circuit

Starting from the top of the diagram, we use a 3-to-8 decoder to provide both read and write control signals to any registers on the peripheral card. For example, in a parallel card, one of the control signals may be used to enable data from a bus driver chip onto the bus. Another control signal may be used to acknowledge that data was read.

Notice the use of Q3 as an enable signal for the decoder. While this is not required, it reduces the chance that a noise spike would accidentally enable one of the control signals. More on these noise spikes follows in the next section.

Continuing downward in the circuit diagram, the next section of logic enables data from the peripheral card onto the system data bus. Again, we use Q3 to provide a little more noise protection. Notice that a resistor-capacitor network is attached to the enable input of the data buffer. This R-C delay is included to fix a timing problem in some Apple II+'s. This problem can be traced to the way the 6502 is used in the Apple II series.

In the Apple II, all timing signals are in reference to the system clocks Phase 0 and 1, which are also used as the main clock signals for the 6502. However, when the 6502 reads data, the data hold time is specified in reference to a signal called Phase 2, which is equivalent to a slightly delayed Phase 0. Therefore, to meet the 6502 data hold time the Phase 0 signal should not be used to clock data off the data bus. If Phase 0 is used, then the data may not stay on the data bus long enough for the 6502 to read it properly. To avoid this problem, we use the R-C delay in series with the enable line of the data buffer that is used as the data bus driver. This causes a delay which keeps the data bus buffer active on the data bus long enough to guarantee that the 6502 data hold time specification is met. While the use of R-C delays is normally frowned upon, the loose tolerance required here, together with the lack of any suitable timing signal, justifies its use.

The next section of logic in the circuit diagram shows a connection scheme for the ROM. In theory, each I/O slot can access up to 2.25K of ROM, 2K for the expansion ROM space and the rest for the peripheral card ROM (I/O SELECT) space. However, in practice, most peripheral cards are still limited to 2K because at the time they were designed, a 2K ROM was cheaper than a 4K ROM, which would be needed if all 2.25K was used. Using a 2K ROM requires a little hardware 'trickery' because the single page of peripheral card ROM code must share the ROM with the expansion ROM code, which is now limited to 7 pages of code instead of 8. Most peripheral cards 'fold' the peripheral card ROM page into either the first page or the last page of the ROM. Our example circuit shows how to fold the code into the last page of ROM. We do this by forcing the three high address lines of the ROM, which can be thought of as the page select lines, into the 'high' state whenever address line A11 is low. Address line A11 will be low whenever the peripheral card ROM space is accessed since the address range for this space is from $C100 to $C7FF.

In this ROM addressing technique, we use the first 7 pages of the ROM, from $C800 through $CEFF, for the expansion ROM space. We use the last page of the ROM for the peripheral card ROM space ($Cn00), which means the $CFxx address space is not used. Therefore the address for the expansion ROM disable, $CFFF, does not have to be fully decoded. Partial decoding of this address is sufficient to disable the expansion ROM space, since no access in the $CF00 to $CFFF range is ever needed during normal operation.

The last section of logic in the circuit diagram shows how the partial decoding of the expansion ROM disable address can be implemented. The R(eset) input of the Flip-Flop will become active whenever the input logic detects any address in the range $CF00 through $CFFF. By only partially decoding the expansion ROM disable address, the circuit requires just two gates instead of a complete chip, which would be needed if the full $CFFF is decoded.

Other peripheral cards fold the peripheral card ROM (I/O SELECT) page of code into the first page of the ROM by using AND gates instead of the OR gates. The address line A11 is connected directly to these AND gates to force the page select address lines low whenever the I/O SELECT range is accessed ($Cn00, where 'n' is the slot number from 1 to 7). This forces the peripheral card ROM page of code to come from the first page of the ROM. The expansion ROM space then covers the last 7 pages of the ROM, including the $CFxx page. If this page is needed, then the full expansion ROM disable address $CFFF must be decoded.

You may be able to find 4K EPROMs, such as the 2732, cheaper than 2K EPROMs. If a 4K EPROM is used instead of a 2K EPROM, then the system address lines A0 thru A11 can be connected directly to the address inputs of the ROM. The peripheral card ROM code should be repeated in each of the first 8 pages of the ROM, while the last 8 pages should contain the expansion ROM code.

The last part of the schematic differs from a similar example shown in the section on the expansion ROM space of the *Apple IIe Reference Manual*. In the Reference Manual example, the expansion ROM enable latch is disabled whenever the address $CFFF is detected. In our example, we use a flip-flop with a clock input. The next section describes the reasoning behind this.

Noise

As you can see from our circuit diagram, we provided some extra control signals which are not necessary in the textbook world of digital design. The Apple II bus can be quite noisy at times; it can have voltage spikes as high as 2 volts, which wreak havoc with most TTL chips. Welcome to 'Defensive Digital Designing—What they didn't teach you on the Blackboards.'

To design an Apple II peripheral card, you must anticipate noise spikes. Typically, they occur at specific times on the bus, not at random. Therefore, one way to protect a design is to use a clock signal instead of just combinatorial logic to set and clear flip-flops. We try to use the signal Q3 as a clock signal whenever possible, since most noise occurs when Phase 0 and 1 change states. Since the clock signal Q3 runs at twice the frequency as the CPU clock signals Phase 0 and 1, it provides a falling edge approximately halfway between Phase 0 and 1 state changes. (Note that Q3 is not a symmetrical signal—it has an asymmetrical duty cycle of 4/3.)

Most reliable cards are designed with protection in the logic circuit used to detect the address $CFFF for the expansion ROM disable. Cards that don't include this protection periodically fail because the card accidentally decodes address $CFFF and disables the expansion ROM. This happens because a large ground spike causes TTL circuits to respond as if they've detected a 'high' input logic level. Large ground spikes force the address bus to appear 'high', which triggers the $CFFF address detect

circuit for an instant, causing the expansion ROM to be disabled. A circuit which had this problem is shown in the schematic for Apple's Super Serial Card. The output of the address decode gate (74LS11 at location 2C, pin 8) has a resistor-capacitor delay circuit to prevent the ground glitch from affecting it. We suggest that you clock the expansion ROM disable address detect circuit into a flip-flop by using a signal such as Q3.

Another way to filter out the spikes from some of the slot signals such as I/O SELECT and DEVICE SELECT is to include an R-C delay on the signal from the slot. While this slows down the signal edges, it also prevents any short spikes from accidentally triggering logic. Be careful about including any R-C delays directly on clock signals such as Phase 0, Phase 1, Q3, RESET, or I/O STROBE since these signals go directly to all slots. If you load a system up with cards in every slot, then the system will not be able to drive all of the extra loading on these signals. If you must include an R–C delay, then first use a gate to buffer the signal and add the R–C delay to the output of the gate. Typical R-C delay circuits consist of a series resistor of about 200 ohms and a parallel capacitor of about 200 picofarads.

Good board layout practices can also reduce the chances of noise problems. One good technique is to provide a good ground on the PC board and to keep the noisy bus buffer chips as close to the board contact fingers (nearest the slot connection) as possible. You can provide a good ground by keeping the ground and power lines wide and 'gridded' across the board. This can best be accomplished by first routing the ground and power planes, then adding the signals. Don't run the ground plane as a single long signal that meanders around the board from one chip to the next. Provide capacitors for each chip, connected nearest to the power pin. Also, furnish a bulk decoupling capacitor (10 microfarads) between the power and ground signals as close to the contact fingers as possible. This allows the power line to be used as an AC ground when a lot of signal switch states at the same time.

Finally, a technique for designing reliable cards for the Apple II is to specify gold plating on the board edge connector fingers. It's worth whatever extra you may have to pay. Edge connectors are generally the single most unreliable component in the system. Boards with tin plating periodically fail and need to be pulled out of the slot to clean the contact fingers to restore operation.

If you're looking for more information about designing peripheral cards for the Apple II, the following books will prove to be very helpful:

Apple IIe Reference Manual
Available from:
Addison-Wesley
Jacob Way
Reading, MA 01867
(617) 944-3700

Understanding the Apple II
Understanding the Apple IIe
Jim Sather
Available from:
Quality Software
21610 Lassen St. #7
Chatsworth, CA 91311
(818) 709-1721
and:
Brady Books- a division of
Simon & Shuster
One + Gulf & Western Plaza
New York, NY 10023
1-800-624-0023
1-800-624-0024 (N.J.)
Info No.
(212) 373-8098

Apple II Technical Notes
(Specifically Peter Baum's Apple //e Hardware Technical Notes)
available to APDA members:
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Renton, WA 98055
(206) 251-6548
Product code: K2BU86
Price: $25.00
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**Also, some technical notes can be downloaded directly from the A2PRO section on GEnie.*

The Apple II Circuit Description by Winston Gayler
Available from:
Howard Sams Publishing
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About the Author

Peter and Allen Baum have been associated with Apple Computer throughout its history. Allen helped Woz with the design and firmware of the original Apple II, while Peter participated in the development of all its successors, the Apple IIe, Apple IIc, and Apple IIGS. They have also been independent developers of Apple II software, such as Jeeves distributed by PBI Software, and hardware peripherals such as Applied Engineering's Ramworks card. Currently they have a consulting company in Silicon Valley, called Ninth Wave Technologies, which assists in the development of peripherals and software for Apple's computers and in the design of microcontroller related products. They can be reached at:

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Send in Your Questions

This is the first column in a continuing series dedicated to answering Apple II hardware related questions. We look to this first column as the beginning of a dialogue with you — the readers of *Call -A.P.P.L.E.* — about hardware. So, send in any questions or other comments you may have about the Apple II series (II+, IIe, IIc, or IIGS) to :

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290 SW 43rd St.
Renton, WA 98055
or:
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21907 Almaden Ave.
Cupertino, CA 95014

While one purpose of this column is to provide a forum to discuss technical issues pertaining to hardware development in the Apple II series, it will not be limited to just design questions. If you would like to know more about serial ports or Apple Desktop Bus, then let us know. Drop us a line if you have specific questions about Apple's disk drives or their RGB monitors. Hope to hear from you soon.

Modular Assembly Language Programming Part III
The Curtain Rises

(The "PACK-Man") Bob Bishop

Back in the 1970s, when graphics tablets and other such devices started to become readily available for the Apple II, many artists began to try their hand at generating hi-res images. As a result, many "slide show" programs started to appear. These slide shows would consist of a floppy diskette containing about a dozen or so hi-res pictures which would be loaded in and displayed in sequence on the Apple II's hi-res graphics screen. The simpler slide show programs would merely load each consecutive image on top of the previous image (so that the new image would appear with the familiar "Venetian Blind" effect). Other programmers chose to alternately load their images between the primary and secondary hi-res screens, so that they could instantaneously switch to the new image. In those days the emphasis focused on the images themselves rather than on the method of presentation.

This month, we will look at a module that lets us bring up the hi-res image contained on the secondary screen in a more interesting manner than by merely switching to that screen. The source listing for this module (CURTAIN) is given in Listing 1, and its documentation is given in Table 1.

The CURTAIN module is extremely simple to use. All you have to do is place an image on the secondary hi-res page ($4000-$5FFF) and invoke either the ENTRY named CURTAIN, or the ENTRY named FILMERGE. (There are no calling parameters for either of these two ENTRYs.)

Notice that the CURTAIN module references four EXTRNs named SAVE0, UNSAVE0, BASL, and BASH. The first two EXTRNs, SAVE0 and UNSAVE0, should be well known to you by now as we have already used them in the previous two installments of this series. The source listing for BASL and BASH is shown in Listing 2.

Notice that the BASES module in Listing 2 does not contain any executable code. The module's two ENTRYs, BASL and BASH, are not the names of two subroutines; they are the names of two data tables. (Remember that *any* label can be declared to be a global symbol, not just the names of subroutines.)

The BASES module represents a table of 2-byte pointers to the memory locations corresponding to the beginning of each of the 192 hi-res graphics lines on the primary screeen. The elements of the BASL table represent the least significant bytes of these pointers, and the elements of the BASH table represent the most significant bytes. For example, the first element of the BASL table is $00, and the first element of the BASH table is $20. Therefore, the first (top) line of the hi-res graphics screen starts at memory location $2000. Similiarly, we see that the next line on the hi-res graphics screen begins at memory location $2400, the third line begins at $2800, and so on.

This months' FILMERGE and CURTAIN subroutines represent only two of many ways in which a image on the secondary screen can be brought onto the primary screen. Another interesting way is to "pour" the secondary image down onto the primary screen. (I almost chose to present such a pouring module for this months installment, but I was afraid that a title like "How To Write 'Pour' Programs" would have sounded somewhat questionable!) However, several such hi-res pouring modules are available as part of the P.A.C.K. (Programmers Assembly-language Construction Kit). In addition, the P.A.C.K includes the EDASM assembler and its linking loader, along with subroutine libraries containing hundreds of relocatable modules like the ones being presented in this series. (For more information about the P.A.C.K., contact: *Interactive Arts, 2715 Porter Street, Soquel, California 95073, telephone (408) 475-7047.*)

Well, it's time to bring down the curtain for this month. In the months to come, we'll see that our BASL and BASH tables will be used again when we examine hi-res and double hi-res graphics.

Please rate this article on the Reader Service Card by circling:

71 Excellent **72** Good
73 Fair **74** Poor

LISTING 1

```
                        REL
                        ORG     $1000
*
                        ENTRY   CURTAIN
                        ENTRY   FILMERGE
                        EXTRN   SAVE0
                        EXTRN   UNSAVE0
                        EXTRN   BASL
                        EXTRN   BASH
*
FROM                    EQU     $00
TO                      EQU     $02
BOTTOM                  EQU     $04
WAIT                    EQU     $FCA8
*
* LOWER A LO-RES CURTAIN.
* THEN RAISE IT, REVEALING
* THE HI-RES IMAGE.
*
CURTAIN         LDA     #5
                JSR     SAVE0
                JSR     LOWER
UPLOOP          LDA     BOTTOM
                AND     #$07
                TAX
                INX
CLIKUP          LDA     BASL,X
                STA     FROM+0
                LDA     BASH,X
                STA     FROM+1
                DEX
                CPX     #$C0
                BCS     NEXT
                JSR     XEROX
NEXT            CLC
                TXA
                ADC     #$09
                TAX
                CPX     BOTTOM
                BCC     CLIKUP
RAISED          LDX     BOTTOM
                JSR     REVEAL
                DEC     BOTTOM
                BNE     UPLOOP
                LDX     BOTTOM
                JSR     REVEAL
                JMP     UNSAVE0
*
* LOWER A LO-RES FILM.
* THEN PEEL IT OFF, RE-
* VEALING THE HI-RES IMAGE.
*
FILMERGE        LDA     #5
                JSR     SAVE0
                JSR     LOWER
                LDX     #$BF
PEEL            LDA     BASL,X
                STA     TO+0
                STA     FROM+0
                LDA     BASH,X
                STA     TO+1
                EOR     #$60
                STA     FROM+1
                JSR     COPY
                LDA     #$40
                JSR     WAIT
                DEX
                CPX     #$C0
                BCC     PEEL
                JMP     UNSAVE0
*
* ACTIVATE THE HI-RES SCREEN AND
* BRING DOWN THE CURTAIN/FILM
*
LOWER           STA     $C050
                STA     $C052
                STA     $C054
                STA     $C057
                LDA     #$00
                STA     BOTTOM
                JSR     PATTERN
DOWNLOOP        LDX     BOTTOM
CLIKDOWN        LDA     BASL,X
                STA     FROM+0
                LDA     BASH,X
                STA     FROM+1
                INX
                CPX     #$C0
                BCS     DOWN
                LDA     BASL,X
                STA     TO+0
                LDA     BASH,X
                STA     TO+1
                JSR     XEROX
                SEC
                TXA
                SBC     #$09
                TAX
                CPX     #$C0
                BCC     CLIKDOWN
                INC     BOTTOM
                LDA     BOTTOM
                AND     #$07
                BNE     DOWNLOOP
                JSR     PATTERN
                JMP     DOWNLOOP
DOWN            LDA     #$00
                JMP     WAIT
*
* CREATE CURTAIN/FILM PATTERN
*
PATTERN         SEC
                LDA     #$BF
                SBC     BOTTOM
                TAX
                LDA     BASL,X
                STA     FROM+0
                LDA     BASH,X
                EOR     #$60
                STA     FROM+1
                LDX     #$00
                BEQ     XEROX ALWAYS
*
REVEAL          LDA     BASL,X
                STA     FROM+0
                LDA     BASH,X
                EOR     #$60
                STA     FROM+1
*
* COPY "FROM" LINE TO X-REG LINE
*
XEROX           LDA     BASL,X
                STA     TO+0
                LDA     BASH,X
                STA     TO+1
COPY            LDY     #$27
COPYCAT         LDA     (FROM),Y
                STA     (TO),Y
                DEY
                BPL     COPYCAT
                RTS
```

TABLE 1

Module: CURTAIN **Length: $00E7**

ENTRYs: CURTAIN, FILMERGE

EXTRNs: SAVE0, UNSAVE0, BASL, BASH

Description of CURTAIN:

CURTAIN transforms the secondary hi-res screen into a lo-res image and brings down this lo-res image as a curtain on the primary hi-res screen. As the curtain rises, it reveals the image on the secondary hi-res screen.

Return with:

$2000-$3FFF: containing a copy of $4000-$5FFF
Primary hi-res screen: turned on
X-Register: intact
Y-Register: intact

Description of FILMERGE:

FILMERGE transforms the secondary hi-res screen into a lo-res image and brings down this lo-res image as a sheet of film onto the primary hi-res screen. The image from the secondary hi-res screen then fills in from bottom to top on the primary screen, producing the effect of the film being peeled off.

Return with:

$2000-$3FFF: containing a copy of $4000-$5FFF
Primary hi-res screen: turned on
X-Register: intact
Y-Register: intact

LISTING 2

```
 1              REL
 2              ORG     $1000
 3  *
 4              ENTRY   BASL
 5              ENTRY   BASH
 6  *
 7  BASL        DFB     $00,$00,$00,$00
 8              DFB     $00,$00,$00,$00
 9              DFB     $80,$80,$80,$80
10              DFB     $80,$80,$80,$80
11              DFB     $00,$00,$00,$00
12              DFB     $00,$00,$00,$00
13              DFB     $80,$80,$80,$80
14              DFB     $80,$80,$80,$80
15              DFB     $00,$00,$00,$00
16              DFB     $00,$00,$00,$00
17              DFB     $80,$80,$80,$80
18              DFB     $80,$80,$80,$80
19              DFB     $00,$00,$00,$00
20              DFB     $00,$00,$00,$00
21              DFB     $80,$80,$80,$80
22              DFB     $80,$80,$80,$80
23              DFB     $28,$28,$28,$28
24              DFB     $28,$28,$28,$28
25              DFB     $A8,$A8,$A8,$A8
26              DFB     $A8,$A8,$A8,$A8
27              DFB     $28,$28,$28,$28
28              DFB     $28,$28,$28,$28
29              DFB     $A8,$A8,$A8,$A8
30              DFB     $A8,$A8,$A8,$A8
31              DFB     $28,$28,$28,$28
32              DFB     $28,$28,$28,$28
33              DFB     $A8,$A8,$A8,$A8
34              DFB     $A8,$A8,$A8,$A8
35              DFB     $28,$28,$28,$28
36              DFB     $28,$28,$28,$28
37              DFB     $A8,$A8,$A8,$A8
38              DFB     $A8,$A8,$A8,$A8
39              DFB     $50,$50,$50,$50
40              DFB     $50,$50,$50,$50
41              DFB     $D0,$D0,$D0,$D0
42              DFB     $D0,$D0,$D0,$D0
43              DFB     $50,$50,$50,$50
44              DFB     $50,$50,$50,$50
45              DFB     $D0,$D0,$D0,$D0
46              DFB     $D0,$D0,$D0,$D0
47              DFB     $50,$50,$50,$50
48              DFB     $50,$50,$50,$50
49              DFB     $D0,$D0,$D0,$D0
50              DFB     $D0,$D0,$D0,$D0
51              DFB     $50,$50,$50,$50
52              DFB     $50,$50,$50,$50
53              DFB     $D0,$D0,$D0,$D0
54              DFB     $D0,$D0,$D0,$D0
55  *
56  BASH        DFB     $20,$24,$28,$2C
57              DFB     $30,$34,$38,$3C
58              DFB     $20,$24,$28,$2C
59              DFB     $30,$34,$38,$3C
60              DFB     $21,$25,$29,$2D
61              DFB     $31,$35,$39,$3D
62              DFB     $21,$25,$29,$2D
63              DFB     $31,$35,$39,$3D
64              DFB     $22,$26,$2A,$2E
65              DFB     $32,$36,$3A,$3E
66              DFB     $22,$26,$2A,$2E
67              DFB     $32,$36,$3A,$3E
68              DFB     $23,$27,$2B,$2F
69              DFB     $33,$37,$3B,$3F
70              DFB     $23,$27,$2B,$2F
71              DFB     $33,$37,$3B,$3F
72              DFB     $20,$24,$28,$2C
73              DFB     $30,$34,$38,$3C
74              DFB     $20,$24,$28,$2C
75              DFB     $30,$34,$38,$3C
76              DFB     $21,$25,$29,$2D
77              DFB     $31,$35,$39,$3D
78              DFB     $21,$25,$29,$2D
79              DFB     $31,$35,$39,$3D
80              DFB     $22,$26,$2A,$2E
81              DFB     $32,$36,$3A,$3E
82              DFB     $22,$26,$2A,$2E
83              DFB     $32,$36,$3A,$3E
84              DFB     $23,$27,$2B,$2F
85              DFB     $33,$37,$3B,$3F
86              DFB     $23,$27,$2B,$2F
87              DFB     $33,$37,$3B,$3F
88              DFB     $20,$24,$28,$2C
89              DFB     $30,$34,$38,$3C
90              DFB     $20,$24,$28,$2C
91              DFB     $30,$34,$38,$3C
92              DFB     $21,$25,$29,$2D
93              DFB     $31,$35,$39,$3D
94              DFB     $21,$25,$29,$2D
95              DFB     $31,$35,$39,$3D
96              DFB     $22,$26,$2A,$2E
97              DFB     $32,$36,$3A,$3E
98              DFB     $22,$26,$2A,$2E
99              DFB     $32,$36,$3A,$3E
100             DFB     $23,$27,$2B,$2F
101             DFB     $33,$37,$3B,$3F
102             DFB     $23,$27,$2B,$2F
103             DFB     $33,$37,$3B,$3F
104 *
```

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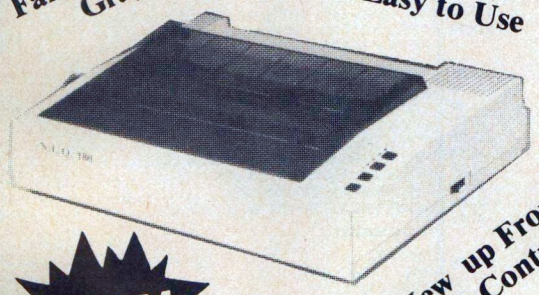

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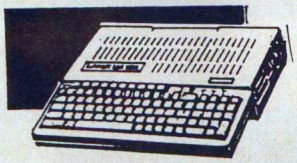

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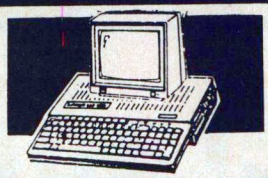

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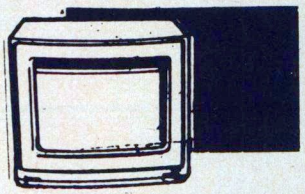

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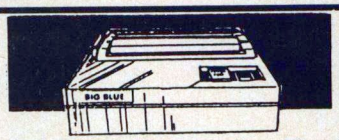

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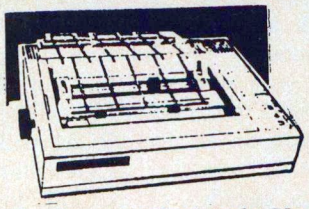

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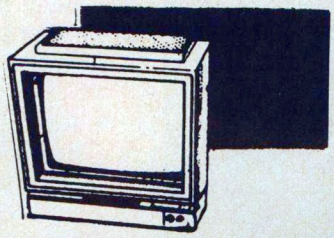

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Wiretapping into BASIC

Sean Nolan

Here is a program that lets you record everything that is printed out to the screen onto a file on your disk. Or you can use it to make a record, again on disk, of all keypresses as they are made. Your choice. You can use it to:

- Record keypresses during program execution. The record can be for software testing or to allow "playing back" the user's input.
- Create a record of your work as you program in BASIC program. With it, you can back up to any previous point.
- Save BASIC listings, catalogs, or output from the Apple's monitor disassembler into a text file on disk.

There are really two assembly language programs at work here. WIRETAP.IN intercepts all keypresses after they are typed, but before any BASIC program sees them, and saves them in a text file on disk. The other program, WIRETAP.OUT, is virtually identical. It intercepts characters as they are printed, rather than typed, and saves them on disk as well. Both programs work only under ProDOS with BASIC.SYSTEM.

The end of this article contains a composite listing for both programs. There are two middle sections. Use the first to get the character output intercepting program. Use the other section to produce the character input interceptor instead.

Both programs work as wedges into the ProDOS character input and output streams. A wedge can be likened to a tap on a telephone line. From one end of the line, characters are sent to be printed on the screen. At the other end, they eventually arrive and get printed. In the middle, the wiretap program has listened in and saved a record on disk.

Here's how WIRETAP.OUT works. And by the way, you don't need to know this stuff. Characters are usually printed by calling a routine in the Apple's ROM called COUT (CharacterOUT). COUT, however, is merely a false front. COUT does not print the character, it merely sends the character through a pointer, or hook, in page zero. This hook points to the standard character output routine in your Apple's ROM. There is a similar hook for character input. These hooks were provided so that software could redirect input and output by changing the address in the hooks. In theory, you can change or intercept character output by grabbing control at the hook. And this would work, if we lived in a world where it never rained and there was no hunger and Apple II's still stored their programs on cassette tape.

However, ProDOS and DOS 3.3 both patch the page zero hooks to point into their own code. That's how the operating system stays in control. ProDOS looks at all input and output just in case

something interesting, like <Control-D>"CATALOG", is printed. If it sees nothing of interest, it then passes the characters through input/output hooks of it's own. These second generation hooks now serve the function that the page zero hooks had on a disk-less Apple II. In ProDOS these hooks are at $BE30 and $BE32.

My wiretap saves the address found in the secondary hook, and replaces it with the address of a write-character-to-text-file-on-disk routine (or an "informationeinordnungslagerung", as we in the biz casually refer to it). The informationeinordnungslagerung ends by jumping back to the original address saved from the secondary hook. Ultimately the intercepted character gets saved on disk *and* gets sent to the screen display.

Because of where I tap the output stream, the wiretap will not see any characters that do not pass through the ProDOS input/output hooks. Characters POKEed directly onto the screen, for example, will not appear in the text file record.

Tapping Output

I wrote the program for capturing character output in order to dissassemble the ROMs inside my IIGS. I turned on the printer, went into the monitor, and dissassembled. That gave me a print out on paper, but I really wanted it as a text file on disk. That way I could edit and comment the dissassembly with my word processor. And so, I wrote WIRETAP.OUT.

With WIRETAP.OUT, anything that can be listed can be captured on a text file. You might want to catalog your disks into text files, and then add a comment column to the result with a word processor. You can use the program to convert BASIC files into text files.

Before you can use the tap you must lower HIMEM by 1024 bytes. The informationeinordnungslagerung needs a 1K space for file buffering. Although you can place this buffer elsewhere, the program as listed must be modified if you choose to do so. W*arning*: lowering HIMEM will erase all variables in memory. It may also be incompatible with some other utility programs such as GPLE (Global Program Line Editor). If you are using no special hidden Applesoft utilities, you're ok.

The other requirement is to set the prefix to whatever disk you want your text file record stored on. In summary, these commands will turn on the wiretap:

```
1
2
3
4   Character input / output Wiretap
5
6   Sean Nolan
7
8   This program intercepts character input
9   or output and saves all characters in a
10  text file named WIRETAP.TEXT.  In order
11  to work the prefix must be set the target
12  volume and HIMEM must be lowered by 1024
13  bytes so that this program has an I/O
14  buffer.
15
16  Turn on with CALL768
17  Disconnect with CALL771
18
19
20
21
22                  ORG   $300
23
24  OUT?            =     1             if1,assemble
                                        WIRETAP.OUT
25                                      ;if 0, assemble
                                        ; WIRETAP.IN
26
27  IObuffer        =     $9600         HIMEM must be $9200
28  VECTOUT         =     $BE30
29  VECTIN          =     $BE32
30  MLI             =     $BF00
31  COUT1           =     $FDF0
32  PRNTX           =     $F944
33
34
35                  JMP   Init
36                  JMP   Disconnect
37
38
39  **********      initialization
40
41
42  Init            JSR   MLI           Delete the file
                                        if it exists
43                  DFB   $C1
44                  DA    Destroyp
45
46                  JSR   MLI           create new file
47                  DFB   $C0
48                  DA    Createp
49                  BCS   InitErr
50
51                  JSR   MLI           open the file
52                  DFB   $C8
53                  DA    Openp
54                  BCS   InitErr
55
56                  IDA   Openn         copy reference
                                        numbers
57                  STA   Writen
58                  STA   Closen
59
60
61
62  The following code is specific to WIRETAP.OUT
63
64
65
66                  DO    OUT?
```

```
HIMEM: 37376
BLOAD WIRETAP.OUT, A$300
PREFIX /MYDISK
CALL 768
```

Now do a Catalog, list a BASIC program, or enter the monitor and disassemble some ROM. If something goes wrong, such as running out of disk space for the text file, WIRETAP.OUT will disconnect itself and display a message like:

File Closed - MLI error $48

The MLI error number may vary. $48 means that the disk is full. Error $40 usually indicates that you forgot to set the prefix. Error $56 either means that you forgot to lower HIMEM or that some other utility (such as GPLE) is already using the memory above HIMEM.

Now turn the wiretap off with:

CALL 771

There should be a text file called WIRETAP.TEXT on your disk.

Tapping Keyboard Input

With minor modifications, the Wiretap can make a record of all keyboard input. This is often called "Journaling". One common purpose for journaling is to record the menu choices made by a user during software testing. One could tell, for example, how many times initial users go to a help screen, or how many incorrect menu choices were made. A journal which reveals that every other menu choice was followed by an immediate cancel command may imply that further user interface polishing is necessary.

Alternately, the journal could be read back off of disk, causing the user's actions to be "played back". A maze program, which uses the arrow keys to move through the maze, could retrace the user's tortuous path in seconds by reading the complete record of keypresses off of disk.

Well, it's time for me to get back to work. I got into this Wiretap business in order to disassemble the IIGS ROMs, and they're awfully big.

Please rate this article on the Reader Service Card by circling:

81 Excellent **82** Good
83 Fair **84** Poor

```
                IDA   VECTOUT        copy original output
                                     address
                STA   OldVect+1      to exit of this wedge.
                IDA   VECTOUT+1
                STA   OldVect+2

                IDA   #<Enter        connect the wiretap
                STA   VECTOUT
                IDA   #>Enter
                STA   VECTOUT+1
                RTS

Enter           STA   Char
                JSR   MLI
                DFB   $CB            write character to file
                DA    Writep
                BCS   Error          exit if error

                IDA   Char
OldVect         JSR   $FFFF          pass it along to
                                     the original
                RTS                  ; character output
                                     ; routine

Disconnect
                IDA   OldVect+1
                STA   VECTOUT
                IDA   OldVect+2
                STA   VECTOUT+1
                                     ;Close routine follows


The following code is specific to WIRETAP.IN


                ELSE

                IDA   VECTIN         copy original
                                     input address
                STA   OldVect+1
                IDA   VECTIN+1
                STA   OldVect+2

                IDA   #<Enter        connect the wiretap
                STA   VECTIN
                IDA   #>Enter
                STA   VECTIN+1
                RTS


Enter
OldVect         JSR   $FFFF          read keyboard first
                STA   Char
                JSR   MLI
                DFB   $CB            write to textfile
                DA    Writep
                BCS   Error          exit if error

                IDA   Char
                RTS

Disconnect
                IDA   OldVect+1
                STA   VECTIN
                IDA   OldVect+2
                STA   VECTIN+1
                                     ;Close routine follows
```

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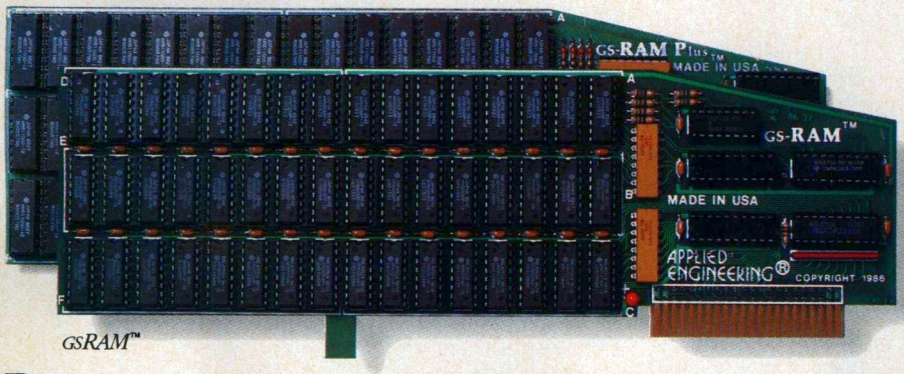

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Only GSRAM and GSRAM Plus eliminates AppleWorks internal memory limits, increasing the maximum number of records available from 6,000 to over 25,000 and only GS-RAM and GSRAM Plus increases the number of lines permitted in the word processing mode from 6,000 to over 15,000. And only GSRAM and GSRAM Plus offers a built-in printer buffer so you can continue using AppleWorks while your printer is printing. GS-RAM and GSRAM Plus even expand the number of lines in the dipboard from 255 to 2047 and will auto segment large files so they can be saved on two or more disks. You can even have Pinpoint or Macroworks and your favorite spelling checker in RAM for instant response. GSRAM and GSRAM Plus will even display the time and date right on the AppleWorks screen. Nothing comes close to enhancing AppleWorks so much.

Turn Your IIGS into a Giant

Simply plug GSRAM into the IIGS memory expansion slot and you've got up to *8 megabytes* of RAM at your fingertips—all of it instantly and automatically recognized by the IIGS. GSRAM is compatible with all IIGS software, including AppleWorks, as well as BASIC®, ProDos, DOS 3.3, PASCAL®, "C" and CP/M®.

Grow by Bytes or Megabytes

We offer GSRAM in two configurations so you can increase your memory 256K at a time (GSRAM) or a megabyte at a time (GS-RAM Plus). Both offer full compatibility, lower cost than other boards, and easy expandability. And both are extremely low in power consumption. A fully expanded GSRAM operates at only 375 ma, and GSRAM Plus at only 270 ma (even with 6 megabytes on board!)

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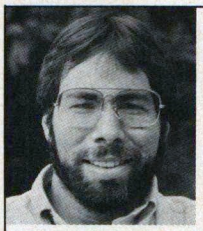
GSRAM is available with 256K, 512K, 1 MEG or 1.5 MEG of memory already on board. If you don't need the full 1.5 MEG now, you can choose a GSRAM with less memory and expand it up to 1.5 MEG in the future—or upgrade to GSRAM Plus for a small charge.



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Steve Wozniak, the creator of Apple Computer

With an optional piggyback card, you can expand GSRAM even higher than 1.5 MEG! (Other cards are only expandable to 1 MEG.)

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GSRAM Plus is the first Apple memory card to use 1 MEG RAM chips on the main board. It's available with 1 to 6 MEG on board. If you don't need the whole 6 MEG now, you can buy a GSRAM Plus with less memory and easily expand it in the future.

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GSRAM with 2-8 MEG	**CALL**
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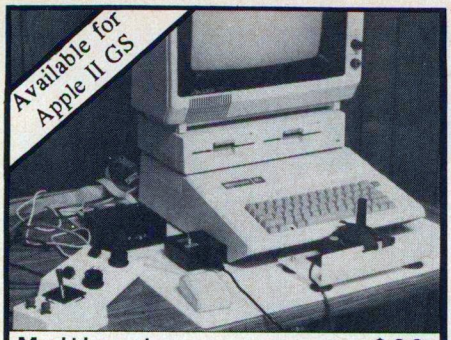
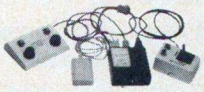
CIRCLE 3 ON READER SERVICE CARD



Multiport $60



The *Multiport* unit extends the game peripheral plug in the Apple IIe, IIc, IBM PC or XT for easy access. Three devices, including the Apple Mouse can be switch selected on the Apple computer and two on the IBM. Stop having to change plugs every time you change devices! Just plug your Joystick, Gamepaddles and/or Mouse into the *Multiport* and change one switch to select among devices.

PSS Joystick Adapter $35

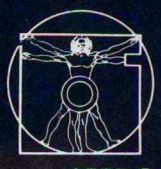
The *PSS Joystick Adapter* was designed to allow utilization of digital type joysticks with the Apple Computer. One easy-to-use flip switch toggles from normal operation to joystick mode. The *Joystick Adapter* is suitable for use on the Apple IIe or II+ computers. With IIe, regular Apple controllers can be plugged into the computer in the normal manner. A Select-A-Port device is recommended when used with an Apple II+.

Paddle Panel $40

The *Paddle Panel* replaces the hand held gamepaddle devices allowing better control. *The Paddle Panel* units are available for use on the Apple IIc, IIe, Atari and IBM computers. It plugs directly into the game I/O port on the back of the computer. This accurate and quality hardware is compatible with programs produced by Psychological Software Services, Inc. and other programs requiring gamepaddle input.

Joystick Holder $40

The *"Firm Grip" Joystick Holder* was designed to allow easy use of the Joystick for persons with limited or no use of one hand. Two straps hold the Joystick in place while four suction cups on the bottom secure it to a smooth flat surface The Plexiglass Undersheet (optional) provides an attractive workspace and a good hold for the suction cups.



Psychological Software Services, Inc.

6555 Carrollton Avenue
Indianapolis, IN 46220
(317) 257-9672

CIRCLE **18** ON READER SERVICE CARD


```
133                FIN
134
135
136
137   The following code is common to both
138
139
140
141   Close        JSR   MLI
142                DFB   $CC              close file
                                          WIRETAP.TEXT
143                DA    Closep
144                RTS
145
146
147   *********error handling
148
149
150   Error        PHA                   ; remember error
                                          ; number
151                JSR   Disconnect
152                PLA
153
154   InitErr      TAX                   ; enter here if
                                          ; error on startup
155
156                JSR   Close
156
157
158                IDY   #0
159   ]loop        IDA   Text,y          print error message
160                JSR   COUT1
161                INY
162                CPY   #26
163                BNE   ]loop
164                JMP   PRNTX           print error number
165
166   Text         ASC   "Fileclosed-MLI error #$"
167
168
169   *********ProDOS MLI parameter lists
170
171
172   Destroyp     DFB   1
173                DA    Name
174
175   Name         STR   "WIRETAP.TEXT"
176
177   Createp      DFB   7
178                DA    Name
179                HEX   C3
180                HEX   04
181                DA    0
182                DFB   1
183                DA    0,0
184
185   Openp        DFB   3
186                DA    Name
187                DA    IObuffer
188   Openn        DS    1
189
190   Closep       DFB   1
191   Closen       DS    1
192
193   Writep       DFB   4
194   Writen       DS    1
195                DA    Char
196                DA    1
197                DS    2
198
199   Char         DS    1
```

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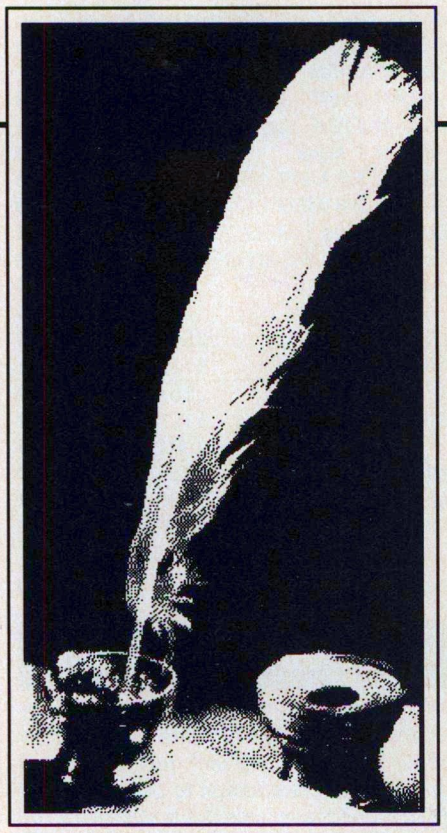
CIRCLE 14 ON READER SERVICE CARD

Further Adventures in Word Processing

Marc Apfelstadt



Last month's article examined three unique approaches to word processing. In this two part series, I would like to look at a broad spectrum of alternative programs. Generally, large-scale reviews of software take one of two approaches—either they display a feature chart in infinite (and mind-boggling) detail, or they give brief descriptions of the product features (which can sound suspiciously like ad copy).

I would like to try a new angle on the problem: descriptive commentary on the "user interface", strengths, and potential drawbacks of each program. I hope that it is just enough to help make a decision about which suits your personal style of computing.

Rather than try to address *every* package available, I'll get to a fairly large cross-section of the new products and recently upgraded ones. If you're like me, you wonder every time the next magazine issue arrives, "Can it *really* do all of that? Should I give up on my old faithful XX.SCRIBBLER and move up to state of the art software?" As much as possible, I'll try to remove the indecision with information.

Incidentally, documentation will be mentioned only where it is problematic. If it isn't cited, you can assume that it is clear, well indexed, and contains both tutorial and reference sections. The software industry has shown a tremendous awareness of the problems poor documentation can cause, perhaps because they've been on the receiving end of the support telephone lines! The quality and clarity of the manuals for this software is vastly improved over the level considered acceptable two years ago.

I have tried to be as accurate as possible in addressing details about specific packages. If any errors have slipped in, I apologize in advance to the publishers & authors. Hardware for the evaluation covered the gamut, since I have a fair bit available. Computers included an enhanced IIe with a 1 meg RamWorks II, a IIc with 768K Z-Ram II, and a IIGS with a 1 meg Apple card. Printers were a ProWriter 8510 with a Grappler + interface and an ImageWriter II connected through the IIc and IIGS serial ports. With that variety of equipment, inconsistencies and incompatibility problems tended to surface rather quickly.

Sensible Writer

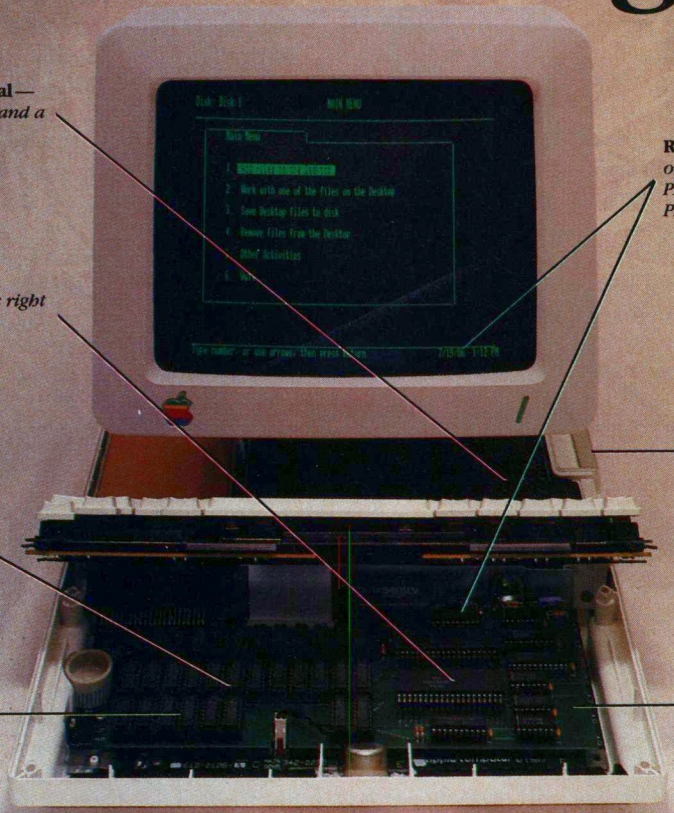
Sensible Writer is surely one of the newest entries into the market, since it is just now ready for release. The package comes with both 5 1/4 and 3 1/2 inch disks, and is not copy protected. In screen appearance, it is quite similar to MouseWrite (which was reviewed last month)—ruler above, mouse selection from pull-down menus (with keyboard equivalents), and many of the other "II = Mac" interface icons. The screen is handled with MouseText, so screen refresh in INSERT MODE is fairly quick compared to software which uses graphics display.

Each document begins with a "Master Ruler" of tabs and margin settings, and you can insert additional rulers at any point in the document. The difference between this program and the MultiScribe ruler concept is that Sensible Writer rulers cannot be shown in place with the text they affect. Instead, the values displayed at the top of the window apply to the text at the cursor location. There isn't a way to set a default "Master Ruler" for startup, but you could always create and save a dummy document with the setup you use most frequently.

Sensible Writer reads AppleWorks and Text files directly, so file conversion is minimized if you're pondering a switch. A Mail Merge facility is provided, with variables allowed in mixed order—not like the programs where one must use items in the order the data base presented them! One other nifty idea is a menu option for addressing envelopes. Two or three 'mousestrokes' will automatically pick off both return and inside addresses from your current document and print a long or short envelope.

Two open documents are permitted at a time, with cut and paste supported between them. If you have expanded RAM in your system, Sensible Writer will load onto it and then permit up to 512K to be used—a maximum of two 256K documents. A couple of minor things I noticed: the keyboard command to turn Underline on and off is <CTL>-Underline, which must be shifted (no other

Z-RAM® gave the IIc guts. Now comes the glory.



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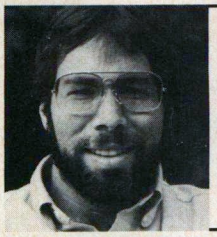

"I recommend Applied Engineering products wholeheartedly." (Of course, Steve's IIc has a Z-RAM installed.)

Steve Wozniak, the creator of Apple Computer

Ultra smart. Ultra speedy.

With any Z-RAM Ultra, your AppleWorks word processor capacity will instantly increase from 2,250 lines to over 15,000 and the maximum number of records from 1,350 to over 25,000. Available desktop memory rockets to over 700K with *all* of AppleWorks loaded into RAM. Z-RAM Ultra even expands the clipboard and autosegments large files so they can be saved on two or more disks. Nothing else comes close to enhancing AppleWorks like this!

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That's just the beginning.

Memory and speed are only part of the story. Z-RAM Ultra 3 also has a built-in Z-80B microprocessor that allows it to run CP/M programs (the largest body of software in existence)—including WordStar, dBase II, Turbo PASCAL, Microsoft BASIC and more. A PRO-DOS compatible battery backed-up clock not only displays time and date on the AppleWorks screen, but will time and date stamp any PRO-DOS file. And a printer buffer handles printing of AppleWorks files so you can continue working.

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commands are). A "Print Selected Text" option is lacking, though page range printing is supported.

What I had available for evaluation was a 'late beta' version of the software. I managed to end up in the monitor a couple of times during "Ruler" commands, though I had more problems with some of the other 'released' software than with the beta copy of Sensible Writer! Sensible Software has a good reputation for standing behind their programs, and product support counts for a lot when you make a major investment. As part of the release promotion, the early packages shipped contain a certificate which allows purchase of Sensible Speller, Sensible Grammar, Bookends, or Graphics Department for only $20. In combination with the flexibility and power of Sensible Writer, initial purchasers get a super value. Hats off for releasing it without copy protection, too! With the clear documentation and simple user interface, this will be a strong addition to the market, Bank Street Writer IIGS

Bank Street Writer Plus

Broderbund has just released a new version of an old standard, Bank Street Writer Plus, which adds some features to the original. To begin with, Bank Street Speller is now built into the program. Along with that, a Thesaurus function is available for synonym searches.

If you don't happen to be familiar with Bank Street Writer's interface, text is entered in 80 columns. Display is handled in hi-res graphics mode, so color isn't supported on the 'GS'. The program *is* IIGS compatible, though. Print formatting commands show inverse blocks with the command description, so this isn't a WYSIWYG (what you see is what you get) entry style by any stretch of the imagination. Printing margins are set at print time, and there is a 'print to screen' option for document preview.

The program has moved to ProDOS, and is supplied on copy-protected 5 1/4 disks, with a backup set included in the package. 3.5 disks are available directly from Broderbund under a special exchange program, but Bank Street Writer Plus is not hard disk compatible. Exit from the program is 'hard', with a forced reboot—there isn't a polite exit to ProDOS through the BYE command.

If you have the 800K drive available, it probably makes a lot of sense to use the 3.5 format, since you would be able to keep the dictionary and thesaurus files both on line without doing the 'floppy shuffle'. Mouse support is optional, but the program operates very smoothly with it. A calculator function automatically inserts results at the cursor, and definable function keys give a new flexible 'macro' capability. Macro sets can be saved to disk and recalled, and it is very easy to set up 'shortcut' command access for menu selections.

Printer definition is a bit more complex than the "enter keystroke" type of program, but it is also quite flexible. You are given a table of 14 commands, and can define all except underline on and off any way you wish.

One thing I had problems with—line spacing is a feature of the print menu, so it isn't possible to have a document with randomly mixed triple, double and single spacing unless you want hard code returns at the end of each line. There is a way to mix the format in a limited fashion, since the program contains a quote feature which indents and single spaces a paragraph in a double spaced document. No footnoting is available, but you could fake that by viewing and adjusting the page breaks, then printing each as a 'Quote' at the bottom of the page.

The thesaurus is activated through <Apple>-T, and it searches for a match with the word under the cursor. The speller is available under two options. Choosing the menu selection checks the whole document, while an <Apple>-S searches for the word containing the cursor. If it's fine, the program flashes 'WORD OKAY' then continues. Otherwise, the usual list of suggested spellings is presented for review. I found the Thesaurus and Speller to be very cleanly integrated and useful, representing a major improvement to the program.

The new price, with lots of new features, is $79.95—just $10 more than the original, with a lot more power at your fingertips. If you have a registered copy of the old version, an upgrade is available from the publisher through a special mailing that you will be receiving: a "sell-a-friend" promotion that reduces your upgrade cost. Persuade two people to buy the program, and you get the new version free. If you put a lot of words on paper with simple to moderate formatting requirements, Bank Street Writer Plus might meet your needs, and it scores high on ease of use.

Manuscript Manager

Manuscript Manager, from Pergamon, is a uniquely targeted product. Remember your first formal paper and the sweating you did over footnotes, bibliography format, and other details? If you are involved in scholarly writing and the words APA FORMAT strike dreaded fear in your heart, run, do not walk, to buy this one. APA stands for the American Psychological Association, a society which has a very clearly defined format for scholarly writing in professional journals. While most word processors contain two modes, Edit and Print, Manuscript Manager contains a third which checks your document for syntax according to APA rules—printing an exception report. In addition, many aspects of writing are automated.

You enter footnote and bibliographic citations once, at the appropriate place in your document, and the accessory pages (footnote, bibliography, title page, etc.) are printed for you automatically, correctly spaced and punctuated! The entry mode for references is unique, too. The program contains a "TUTOR" system which walks you through the process while you make selections at prompts [Book/Edited Book/Journal Article], [One author, etc.]. Based upon you entries, the proper format is created for the footnote or reference citation.

The product comes with a copy of the APA style manual, on a 'limited copy protection' disk. The programs can be transferred to 3.5 or hard disk, but the original 'key disk' must be inserted once during the boot process in order to operate. Normally, I despise copy protection, but I can actually understand in this case. Since I work in the university environment, I've seen the number of 'flagrant copies' of software floating around. This scheme is not really awkward, and it offers the publisher some protection. For universities, Pergamon offers a site license option, with reduced pricing on multiple copies if a single person is designated to channel support calls.

The manual for Manuscript Manager is superb! The reference section includes a heading under each command which presents a point form walk-through of the command in use, and the tutorial lessons present clear and accurate examples without being wordy. There is no mouse support, but the program does not suffer for the lack of it.

The command card is concise (2 sides), and the automatic lead throughs for reference entry can be turned off as you become accustomed to the program. There is a Text File converter disk available ($49.95) which allows you to im-

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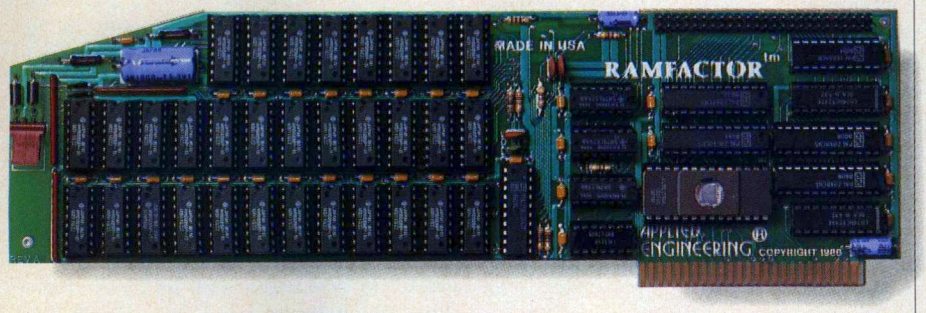

Very Compatible

All the leading software is already compatible with RamFactor. Programs like AppleWorks, Pinpoint, BPI, Managing Your Money, Dollars and Sense, SuperCalc 3A, PFS, MouseWrite, MouseDesk, MouseCalc, Sensible Speller, Applewriter IIe, Business Works, ReportWorks, Catalyst 3.0 and more. And RamFactor is fully ProDos, DOS 3.3, Pascal 1.3 and CP/M compatible. In fact, no other slot 1-7 memory card is more compatible with commercial software.

AppleWorks Power

There are other slot 1-7 cards that give AppleWorks a larger desktop, but that's the end of their story. But RamFactor is the only slot 1-7 card that increases AppleWorks internal memory limits, increasing the maximum number of records in the database and lines permitted in the word processor, and RamFactor is the only standard slot card that will automatically load all of AppleWorks into RAM dramatically increasing speed and eliminating the time required to access the program disk, it will even display the time and date on the AppleWorks screen with any ProDos clock. RamFactor will automatically segment large files so they can be saved on 5¼", 3½", and hard disks. All this performance is available to anyone with an Apple IIe, IIGS *or* II+ with an 80 column card. RamFactor, no other standard slot card comes close to enhancing AppleWorks so much.

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- Automatically recognized by ProDos, DOS 3.3, Pascal and standard CP/M
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- Automatic expansion with AppleWorks 1.3 or later
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port text files and to export text files for use with other programs (modem communications, etc.). If you're doing a document which doesn't quite fit the available print formats, the converter disk has a 'print to disk' option with a neat twist. You can print to a file as straight text, or include markers for print features, which can then be altered with search and replace facilities in another program.

Manuscript Manager is available in 3.5 inch format upon request, and it is 'GS' compatible. An alternate version supports CBE format (Council of Biology Editors), and an IBM version is targeted for spring release. One caution—due to specific requirements of the final document format (super, subscript, etc.), only certain printers are supported, and there is not a provision to add your own definition. The list includes a good cross section of those available [ImageWriter, Epson FX, Diablo, Qume, etc.], but you might want to make sure yours works.

One facet of APA style is that tables and illustrations are printed at the end of a document, since the scholarly journal needs to insert them as page layout information. If you plan a dissertation or thesis with examples included in the text, leave yourself enough blank page space to insert your information with physical cut and paste methods. Upon exiting the program, Manuscript Maager doesn't offer a soft exit to ProDOS, just a forced reboot.

As an interesting note, Pergamon is not primarily a software house. They publish a number of psychological journals, and this program was developed inhouse for their authors in order to cut down on the amount editing required for articles they received. If you do scholarly writing where APA or CBE formats apply, check this one out. It is truly unique, and an incredible time saver!

Word Perfect

Word Perfect underwent a revision in the fall, with the release of version 1.1. This program is as close to an Apple implementation of a true WYSIWYG word processor as you are likely to find. The six floppy disks now contain a built-in spelling checker, which searches in document order. As an interesting option, you can look up a word at any time, and have it inserted at the cursor. The program is not copy-protected, and it is compatible with hard disk and RAM disks.

Word Perfect originated in the IBM world, and it uses <APPLE>-number key combinations (actually, the whole top keyboard row) to emulate the 'function key' bank of the PC keyboard. Print format commands are hidden, so your control characters don't occupy line positions as they do in most other programs. Printer flexibility is almost infinite, and the documentation is a model of clarity and thoroughness.

What is the flip side of the coin? The file structure uses the disk as virtual memory to store the file, so the program is very slow to operate on a floppy drive system. Something as simple as a file print necessitates closing the open temporary file, loading the printer overlay, then printing the file. From a hard disk or RAM disk, the swaps and delays are minimized, but they never really disappear. In addition, a power glitch can be devastating!

The new version of Word Perfect contains RECOVER SYSTEM, a program which attempts to restore the 'overflow files' in the event of a problem. The potential for loss is great enough to prompt purchase of a backup power supply, though, if you use this program regularly. I recall an old adage which seems appropriate: "Let your backup frequency be in direct proportion to the personal pain that loss of the data would cause."

As far as features are concerned, this program has it all. Footnoting support has automatic numbering, so that deleting an early entry from a list of 10 (or 50) correctly numbers the rest when the file is printed. A detailed mail merge facility and macro capabilities with conditional chaining put Word Perfect in a class by itself for sheer power in a heavy duty word processing environment. As if the built-in features weren't enough, version 2.0 of Pinpoint (see comments in AppleWorks Add-ons) is now Word Perfect 1.1 compatible. Not all options work (GraphMerge requires AppleWorks word processor file format, for example), but calendar, communications, and several other accessories are available. In order to work with WordPerfect, PinPoint 2.0 requires RunRun (another PinPoint product). If you plan to use PinPoint behind Word Perfect, be sure to get RunRun as well.

WordPerfect is not the one to buy just for light duty typing, letters to Mom, or a quick draft of a memo, simply because of the disk access involved and the time needed to get familiar with the power of the program. On the Apple, the best operating environment probably includes a healthy sized RAM disk and a hard disk or 3.5 drive. Otherwise, the disk swapping will keep you busy. If your word processing needs are extensive and you have enough hardware to cut down on the 'floppy shuffle', give this word processor a serious look. It handles intricate formats and extensive documents with ease.

WordPerfect also released a GS version which expands the dictionary to over 80,000 words and uses the graphics mode for screen display.

AppleWorks

AppleWorks has established itself as a unique program in the software industry. Version 2.0 incorporates some subtle programming changes, new documentation, and some added features (mail-merge and spreadsheet functions). The new release also comes with both 5 1/4 and 3.5 disks in the package. The file card interface has become a classic, so I don't think that space needs to be spent describing its ease of use and flexibility!

AppleWorks has done a lot for many people. In my opinion, the word processor isn't quite as strong as the other two applications. Print format characters take up spaces on the screen, and there is only one character size per line. You can't mix type sizes with reckless abandon, which limits your print flexibility a bit. Changing printer options can also be cumbersome and time consuming if you try anything intricate, though a 'boilerplate' concept of blank documents with only format commands in place works well. It is really a shame that the program isn't <RESET> protected. Tom Weishaar reported a reset recovery routine in his *Open-Apple* newsletter last fall, and I've also seen an inexpensive program advertised that lets <RESET> return you to the top menu level. For further information contact: *Living Legends Software, 1915 Froude St. San Diego, CA 92107 (619) 222-3722.*

On the positive side, there isn't a printer definition routine anywhere that is easier to use than the one in AppleWorks. For sheer simplicity, nothing comes close. In combination with the other applications, the AppleWorks word processor is still a powerful tool.

AppleWorks Add-Ons

The most interesting part of the AppleWorks phenomenon has been the rise of the ADD-IN and ADD-ON software packages. There are now several packages that get inside of AppleWorks,

expand memory capacity, and add mouse support and other features. The problems which arise result from relative compatibility and memory use. At least part of your choice for *add in* software relates to your particular hardware setup and the version of AppleWorks you are using, while another factor may be brand loyalty to a particular publisher. Here are my thoughts on the matter, for what they are worth.

Jeffery Jacques has been devoting space in the Spreadsheet Sheet extolling the virtues of macros—single key commands to trigger text and program events. Three different programs now add the capability to AppleWorks. MacroWorks, from Beagle Bros, offers Macro support and mouse support to users of versions 1.0-1.3. Mouse selection from menus works both vertically and horizontally (at YES/NO prompts too!). The Macros need to be compiled and saved to disk as a separate step—there isn't an 'in memory compile' which allows you to create and instantly use a macro.

AutoWorks, from the Software Touch, supports all versions of AppleWorks. Mouse cursor movement is available, but mouse menu selection is vertical only, so you still need to type in 'Y' or 'N' at prompts. There is a memory compile option which is really slick, and the program contains a very good mail-merge facility. Both MacroWorks and AutoWorks allow you to use RAM expansion software. As I see it, if you are running on a basic machine with one or two drives and up to version 1.3 of AppleWorks, choose between full-mousing (MacroWorks) and mail-merge with in memory compile of macros (AutoWorks).

Things clarify a bit more at the AppleWorks 2.0 level. You may need updated RAM software in order to support expansion of AppleWorks 2.0 on Applied Engineering and Checkmate RAM cards. If you use those products, contact your manufacturer for the update. SuperMacroWorks, from Beagle Bros., adds an in-memory compile feature, and the example macros on the disk are phenomenal. AutoWorks 2.0 (just released in late December) offers PinPoint compatibility, along with an equally impressive set of macros! You can install RamWorks on AppleWorks, AutoWorks next, and add PinPoint on top of that. Just think what those little electrons in the CPU are going through! I find it truly mind boggling.

PinPoint offers Key Player, part of the PinPoint integrated series, which gives AppleWorks 2.0 keyboard macro capabilities that are roughly equivalent to those in AutoWorks and MacroWorks, but without mouse support. If you are a convinced 'PinPointer' and you don't have or use your mouse, you will find a good consistency with the other PinPoint utilities. Since Key Player is added as an Accessory, when you choose it, you leave the other accessories behind until you exit Key Player.

At the AppleWorks 2.0 level, it's a matter of brand loyalty to 'the old dog' (yes, I feel that!), PinPoint compatibility with mouse & mailmerge (AutoWorks), or a fully PinPoint (but mouseless) program. If you really can't decide, buy a couple and keep separately configured versions on hand—they're all three reasonably priced, and word processing and other functions become infinitely easier.

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16-9 Adapter **for APPLE][and][+**

With this adapter, owners of early APPLEs can take advantage of the newer 9-pin game products, such as joysticks, **MUPPET LEARNING KEYS™**, etc. **$14.95**

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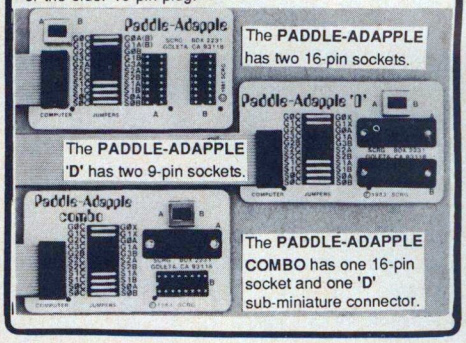
There are three versions to adapt to any combination of the newer type APPLE connector (the 9-pin D sub-miniature), or the older 16-pin plug.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When it comes to adding unique features to AppleWorks, PinPoint (the program, this time) has a unique edge. PinPoint is written to install itself on top of (or inside of, actually) quite a number of ProDOS programs. It then sits quietly, waiting for the press of a Solid Apple-P. Immediately, it jumps into action, displaying a list of up to 16 accessories (8 in the basic package). Selecting one results in a lot of quick disk activity, since PinPoint saves a large block of AppleWorks memory to disk, swaps in the necessary code for the accessory, and goes to work. When finished, the files are swapped back into memory, and AppleWorks doesn't even know it was disturbed.

This is a neat piece of programming, especially given the number of other 'patchers' at work with RAM card mods, etc. The only drawback is one of disk access, if you have a one or two drive system. You'll find that the 'floppy shuffle' can take up an incredible amount of time when you use an accessory. Ideally, a large RAM card and a high capacity drive would minimize the 'swap time', but it never disappears.

The basic accessories vary from the mundane to the unique. Typewriter, calculator, label, and note pad functions are fairly elementary. The Appointment calendar stretches to 1990, marking each day with an asterisk when an item is recorded. Communications requires the right hardware (which I lack), offering dialing and rudimentary on-line functions.

The GraphMerge accessory must be seen to be believed. Basically, you open an AppleWorks word processing document, select and crop up to 16 hi-res or double hi-res pictures, and print them in the middle of your document. If you have a supported printer (ImageWriter, Scribe, DMP, NEC 8023, ProWriter).

Any wrinkles? Just one... It isn't possible to save your document with all of the picture information included, since that would thoroughly confuse AppleWorks. Each time you want to print a 'combination' document, you need to redefine the picture placements. It is probably easiest to clip out the pages with pictures and save them as separate files. That way, your edit time is minimized on reprints. Watch out, too, for RAM expansion—you could have a document that is acceptable in size on a RamWorks card, but which exceeds the size PinPoint permits. Medium to small documents are no problem.

PinPoint Speller is an optional add-on to the PinPoint system. When it is added to PinPoint as an Accessory, you can set it to check words, paragraphs, or entire documents, and it will also check individual field entries from the Spreadsheet of data base functions. As spellers go, it is a bit on the slow side. Still, you don't lose time exiting AppleWorks to check, then rebooting. On the whole, it is a serviceable option to use on the system.

If you are a programmer, the PinPoint Tool Kit allows you to write and add your own accessories. Source code is provided for several of the existing accessories so that you will have models to follow. The PinPoint interlocking system of programs offers a lot of power to users of AppleWorks 2.0 and other supported programs.

Jeeves, from PBI, offers tools roughly equivalent to the PinPoint basic utilities. The program pops up when both <Apple> keys are pressed. I had problems on my IIe when the TimeMaster H.O. was active—the manual mentions that because of the interrupts, it may take a fraction of a second longer to activate Jeeves. With the card in place, I never *did* get Jeeves to pop up! Without the card, there were no problems. Actually, I suspect that Jeeves detected interrupts from both the mouse card and the clock, and didn't know which to listen to. On the IIGS, Jeeves did strange things at exit, leaving hex data on the screen for some reason.

Properly operating inside AppleWorks, Jeeves is a real asset. A calculator, alarm clock, calendar, phone book, and note pad are available. The calendar uses a neat display, with fake shadowed pages—it looks slick on the screen. pages in use aren't marked in any way.

Loading Jeeves and entering the program is quite a bit easier than setting up PinPoint (where you need to go through a configuration process to install it, or to reinstall if you change modem/printer configurations). Basically, you boot up Jeeves, activate it, then exit through a BYE command to AppleWorks or BASIC.SYSTEM.

While the program doesn't offer as many options as PinPoint, it is well written software with clean display designs and solid functionality. Jeeves operates from memory without disk access, perhaps a plus if speed is important to you.

Post Processors:

There are several programs which give you increased flexibility or power by using your AppleWorks files, and print enhancement is one area with increased support. Power Print, from Beagle Bros., allows you to customize type faces and download them to dot matrix printers. Existing fonts can be downloaded as is, or edited with an editing option. You basically work in the same matrix that the printer does, and the printer substitutes the downloaded characters for the standard ones. Power Print also enables you to create a QuickLoad file, which MacroWorks (of course) will automatically recognize and download to your printer as part of the AppleWorks startup procedure. Really, this is a preprocessor, since you need to download the font before printing with it.

FontWorks, from The Software Touch, expands the possibilities even more, as a true post-processing program. Version 2.0 reads and prints AppleWorks files directly, interpreting Bold, Superscript, and Subscript as 'font change' commands. The page is actually printed as dot addressable graphics, so large type faces are supported.

Spreadsheet files can be printed in any one font, but data base files must be moved to the Word Processor through the clipboard in order to work. As an interesting option, you can also specify sideways printing, so this one program serves a multitude of needs. FontWorks prints more quickly than MultiScribe (about 2-2 1/2 minutes per page) and the font definition is super. A font editor is included on the disk, if you prefer to prepare your own designs.

Version 1.0 of FontWorks has more limited capabilities, since it only prints from text files. Why mention it? It works with standard text files, and includes a DOS 3.3 version. Mark Simonsen will make it available on request, and I recommend it for 'fancy print' output from other word processing programs. The Software Touch also has a disk of 25 additional fonts for use with FontWorks, available directly from them on special order.

If you already have AppleWorks (or even if you don't), take a good look at FontWorks. I've used it for everything from posters to letters to the visually impaired, and recommend it highly.

In the next and final installment of this series, we'll look at some new faces and some revised ones. IIGS software is finally beginning to trickle in, and Graphic Writer and MultiScribe GS are both available for examination. Other programs will be mostly of the lower-priced variety, but some are surprisingly

powerful and easy to use. We'll also examine Trio, which offers the same three functions as AppleWorks for 1/3 the price. See you then.

Please Rate this article on the Reader Service Card by circling:

91 Excellent **92** Good
93 Fair **94** Poor

Updates and Clarifications

All three products reviewed in last months' article, Bard, MouseWrite and MultiScribe 2.0, will run on the GS. MouseWrite will use the expanded memory of the special slot card to enhance program features. MultiScribe 2.0 will not use the memory card—that program will run only from disk not /RAM.

If you move back and forth between your GS and IIe or IIc you can use the program on all machines. The GS version of MultiScribe allows color support and multiple open documents so there is definite product differences.

The MultiScribe font disks are out (volumes 1-5: $19.95) and they are great enhancements. Contact StyleWare for a flyer showing the sets, as not all of them will be equally useful to everyone—but each will be needed by someone!

Roger Wagner Publishing, Inc. is preparing a thesaurus accessary to work with MouseWrite, scheduled for release in mid April. There is a "synonym" search for the selected word and you can chain from a word in the offered list to search again. The product will be priced at $59.95, and registered owners will receive a mailing with a special discount offer.

Product information:

Product:
Sensible Writer
Company:
Sensible Software
210 South Woodward
Suite 229
Birmingham, MI 48011
(313) 258-5566
List Price: $99.95
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Product:
Bank Street Writer Plus
Company:
Broderbund
17 Paul Drive
San Rafael, CA 94903-2101
(415) 479-1700
List Price: $79.95
CIRCLE **29** ON READER SERVICE CARD

Product:
AppleWorks 2.0
Company:
Apple Computer, Inc.
(see your local dealer)
List Price: $236
Upgrade: $50
(see your dealer for instuctions)

Product:
Manuscript Manager
Company:
Pergamon Software
Maxwell House, Fairview Park
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CIRCLE **30** ON READER SERVICE CARD

Products:
FontWorks
AutoWorks
FontWorks Font disk #1
Company:
The Software Touch
9625 Black Mountain Road
Suite 204
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(619) 549-3091
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Products:
MacroWorks
SuperMacroWorks
Power Print
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Beagle Bros.
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San Diego, CA 92110-2933
(619) 296-6406
List Price:
MacroWorks: $34.95
SuperMacroWorks: $49.95
Power Print: $39.95
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Products:
Key Player
Desk Accessories
Spelling Checker
Tool Kit
RunRun
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Apple IIGS Compatibility

Enrico Colombini

The Apple IIGS is a very attractive machine, and I think that many of you will choose to upgrade or exchange your old Apple II for the new one. Apart from its capability to run Mac-style programs, the IIGS can also run the old software faster and with many useful enhancements, like the keyboard buffer or other utilities provided by the Control Panel.

There is, however, a problem: is the IIGS able to run all Apple II software without problems? The answer is no: as for every change or improvement in the Apple II line, something is changed, something has been added, and something is missing in the ROM firmware and in the hardware itself. Not all programs run properly on the IIGS.

The design of the IIGS is much more accurate than that of its predecessors (the Apple IIe, the IIc and the Enhanced IIe). This time, every effort has been made to achieve the highest level of compatibility, or at least the minimum incompatibility with older models. In fact, the step from a IIe to a IIGS is a much smoother step than that from a II+ to a IIe, despite the radically different architecture of the new machine.

It is still possible for your favorite program to have problems on the IIGS. Many of these problems do not have a simple solution, but many others can be solved with minimul effort. Let's see how.

Hardware Problems

The Apple IIGS accepts standard Apple II cards in its slots. Not all cards work without trouble: if they use interrupts, they are not likely to work at all. Another critical card is the Apple ProFile interface: some units require a little hardware fix. Be sure to have it checked at an Apple center, or you risk to lose the content of the hard disk.

Other standard Apple cards, such as Apple Parallel Card or Super Serial Card (SSC) work smoothly in the IIGS. Why use these cards, you may ask, when the IIGS comes with built-in printer and modem ports? My old faithful Mannesmann Tally Spirit printer has a parallel interface, so I cannot connect it to a serial port.

The reason for the SSC card is different: the serial ports are the only serious hardware incompatibility between the IIGS and its ancestors. The old serial chip (6551 ACIA) has been replaced by a more powerful Zilog SCC (the same chip used in the Macintosh).

From a software standpoint, the new serial ports are identical to the older ones, but nearly all communication programs chose to bypass the ROM software and use the hardware directly. They succeeded in achieving better performances, but these programs cannot run on the IIGS hardware.

While waiting for new programs expressely designed for the IIGS serial interface, the SSC allows me to use my old communication programs (new versions of major communication programs are coming).

A last note about cards: if you put a card in a slot (say a SSC in the slot 2), you must configure the machine for that card before using it: enter the Control Panel (Control-apple-Esc), choose "Slots" and set "Your Card" for the slot you are using (you lose the corresponding built-in feature, as the serial port in the case of the slot 2).

Software Problems

(easy to solve)

Let's begin from problems which could appear insurmontable, but can be easily corrected:

Screen Filled With '2' (or other characters):

The program uses text page two, which is not supported in the IIGS. You can activate a "text page 2 simulation" by pressing Control-apple-Esc and choosing "Alternate Display Mode". The program slows down, but text page 2 works. Unfortunately, many programs do not allow you to enter the Control Panel or the Alternate Display Mode (by disabling interrupts, I presume), as is the case with the well-known Microsoft Decathlon. Setting the Alternate Display Mode before loading the program doesn't work, because it interferes with normal disk operation. If the program doesn't crash with reset (Control-reset), and returns instead to its title page (as Decathlon does), Control-reset generally allows you to access the Alternate Display Mode with Control-apple-Esc and correct the problem.

Deaf Keyboard:

The computer doesn't respond to the keyboard (in some cases not even to Control-apple-reset!). Do not despair: press Control-apple-Delete and the keyboard comes to life again. Probably the program, during its initialization, has "unplugged" the microprocessor which controls keyboard operations. If the keyboard tends to lock itself again, enter the Control Panel and disable the keyboard buffer (Control-apple-Esc: Options: Keyboard buffer: No). It's a very useful feature, but some programs can't stand it. Don't forget Control-apple-Delete: it resets the keyboard micro and solves many problems.

Serial Interface:

As I said in the above paragraph, many communication programs (such as Apple Access or Ascii Express) require a SSC (Super Serial Card), generally in the slot 2. If, even with the SSC, the program still doesn't work correctly, it is advisable to lower the clock speed of the computer using the Control Panel (Control-apple-Esc: System Speed: Normal). This will satisfy critical timing routines which may be present in the program.

Monitor Problems:

Some multi file programs are loaded by an EXEC file. This file contains a sequence of DOS and monitor commands to load all the parts of the program. If this sequence contains language card switching commands (as C080 <cr>), these commands will be ignored and the loading won't work. The new monitor program doesn't allow the user to change the state of the language card "soft-switches", to avoid machine hang-ups. The EXEC file must be modified to write and execute short machine language programs instead. It's not a hard task for a programmer, but I haven't the space here for a detailed explanation.

Software Problems
(hard to solve)

Some problems cannot be solved without an avid knowledge of the program, and the ability to modify it:

Invalid Instructions:

If the program uses invalid 6502 operation codes, it probably won't work. These codes are recognized by the 65816 as valid instructions, even in 6502 emulation mode. I suspect this to be the cause of Locksmith malfunctioning on the IIGS.

ROM Access:

Many programmers used to call non-documented routines in the middle of the monitor ROMs. This became a major source of trouble when running II+ software on the IIe and IIc, especially with 80-column and mouse firmware (software in ROM). The IIGS designers have made a huge effort to preserve widely used entry points, even if they were not documented, but they could not left the ROMs untouched. I think that the old AppleWriter II (DOS 3.3) has problems for this reason.

Protection Systems:

I don't want to enter the ever-going discussion about software protection, but I am beginning to think (both as a user and software author) that software protection causes much more trouble to the legitimate user than to "pirates". An illuminating example: *BYTE* magazine takes the game "Serpentine" as an example of software incompatibility between the IIGS and older models. I saw an illegal copy of the same program running on the IIGS without problems. Draw your own conclusions.

In Short

The hardware and software compatibility of the Apple IIGS with the old respected family of Apple II computers is very high, even if not complete. Many programs which seem incompatible require in fact only little tricks to work correctly. Before deciding that a program cannot run on the IIGS, try at least the following:

- Verify if the program needs a Super Serial Card in the slot 2 (remember to choose "Your Card" for the same slot in the Control Panel).
- Disable keyboard buffer (Control Panel: Options: Keyboard Buffering: No)
- Unlock the keyboard with Control-apple-Delete.
- Reduce the clock speed (Control Panel: System Speed: Normal).

It is better to modify the Control Panel before starting the program. Don't forget to accept the choices with a Return and exit the Control Panel with the correct sequence (Quit). If you don't, the modifications you made won't be stored in the battery RAM, and nothing will change.

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CIRCLE **9** ON READER SERVICE CARD

ProDOS Memory Management

Dick Winslow

While working on a recent project, I discovered the need for effective memory management. I found what appeared to be the answer in the October 1985 issue of *Call -A.P.P.L.E.* (ProDOS Memory Buffer Management by Cecil Fretwell). Upon closer inspection, however, this "answer" did not meet my needs, as it is dependent upon Basic.System. I wanted to be independent of any system program—a prerequisite if you want to write ProDOS System programs.

ProDOS, by itself, does very little in the way of memory management. If you want to open a disk file, you must allocate the required system IO buffer for it before issuing the Open MLI call! This buffer is a 1K area of memory required by ProDOS in addition to the record buffer the file might use in an application program. This seems strange, that the user of ProDOS is saddled with providing for ProDOS what ProDOS requires, but c'est la vie! ProDOS makes several demands upon "System" programs designed to run with it, and the chore of managing memory via the bit map is but one of them.

The routines accompanying this article will locate free areas of memory of any desired number of pages, as well as mark or clear bits in the system bit map corresponding to any page or groups of pages of memory. These routines also satisfy the requirements for published assembler code outlined by *Bob Bishop* in his recent article *"Let's Start Publishing Usable Assembly Language Code"* (December 1986 issue of *Call -A.P.P.L.E.*). Each routine is presented as a separate generic unit of code with a properly implemented communication interface to the calling program. Let's look at the routines to see what they do, and how they do it.

The first one is GETBUF. This routine accepts a hexadecimal value in the accumulator representing the number of contiguous 256-byte pages of memory to be found, then proceeds to find an area of the required size by looking at the system bit map, using the routine CKMAP. GETBUF starts looking at page $BE, just below the ProDOS Global Page, and proceeds downward through memory, checking each proposed page against the system bit map. Each page found, increments a counter which is compared against the number of desired pages of memory. If a used page is discovered before the required number of free pages have been found, the count is zeroed and the search restarts at the page below the used page. If the process continues until page $20 has been examined, without finding the required number of contiguous pages of free memory, a "No Buffers Available" message code ($0C) is set in the accumulator and the routine returns to the calling program with the Carry bit set in the status register. If the search is successful, the page number of the lowest page of the group of unused pages found is returned in the accumulator, and the carry bit is cleared. The routine uses only a two-byte work area outside itself, which is clearly documented in the accompanying listings. None of the CPU registers are altered by the routine, other than the carry bit in the status register.

CKMAP, being called by GETBUF, is the next routine we shall examine. This routine owes the basis for its code to an example provided by Apple Computer, Inc. in the *ProDOS Technical Reference Manual*, page 89. It turns out that the system bit map may be referenced in the manner of a two-dimensional array of bits, using coordinates of byte number and bit within the byte. What is really helpful is that the page number itself provides the coordinates to access the proper bit in the bit map: the upper 5 bits of the page address represent the byte number within the map, and the lower three bits of the page address represent the complement of the bit number within the byte ($7, all three bits on, represents bit $0 in the byte, for example). The routine is entered with the page address in the accumulator. First, the A, X, and Y registers are all saved on the stack, since the routine uses all three registers in its operation. The page address is then checked to see if it is in any of the memory areas the Apple uses for I/O Slots, ROM or bank-switched memory, all of which are regarded by CKMAP as "busy". If the page is not in any of these areas, its bit is found in the bit map by interpretation of the address as outlined above. The results of the interpretation is a single bit in the accumulator in the same bit position as the desired bit in the byte in the bit map. Along the way, the interpretation process has calculated the offset into the bit map for the proper byte, and stored it in the Y register. An AND is then performed between the accumulator and the byte in the bit map. If the result of the AND is non-zero, then the page of memory must be marked as "busy" in the bit map, so the routine ends with the carry bit in the processor status register set on. Otherwise, the page of memory is free, and the routine concludes with the carry bit cleared. On exit, the A, X and Y registers are all restored to the values they had upon entry to the routine.

SETMAP, the final routine of the three, is used to set or clear bits in the bit map. This routine is very similar to CKMAP since the same bit identification scheme is used. The routine is entered with the number of pages to be marked or cleared in the accumulator, and the page address of the lowest page of the group in the X register. The value in the accumulator also determines whether the routine will set or clear a bit in the bit map. If the high order bit (bit number 7, $80) is on, the routine will operate to reverse the settings of bits in the bit map by using an EOR instruction. If the high order bit of the accumulator is off, however, the routine will operate to

turn on bits that are off, leaving those bits that are on unchanged by use of an ORA instruction. The interpretation of the value in the accumulator and the choice of opcode is made at the very start of the routine, resulting in the desired opcode being stored in the proper place in the CHNG instruction in the routine itself. The routine stores and restores the A, X and Y registers upon entry and as it exits. Apart from its effect upon the system bit map, the routine produces no output to the calling program.

All of these routines are designed for use on enhanced IIe's, IIc's, or later machines in the Apple II product line, since the 65C02 instruction set is used. There are quite a few instructions in each routine, but most of them are single byte instructions, so the routines do not use a whole lot of memory. The accompanying listings were produced using the ProDOS ORCA/M assembler from the ByteWorks of Albuquerque, NM. The attempt has been made, however, to make the code as generic as possible, so the routines may be easily transferred to other assemblers. The GEQU pseudo op is equivalent to the plain EQU of most other assemblers. The effect of the DS pseudo op is to reserve storage without initializing it to any particular value, an operation most assemblers can accomplish, though the peudo ops may vary.

TABLE 1

DESCRIPTION OF GETBUF:

Finds a requested number of contiguous pages of memory that are unmarked in the System Bit Map.

Enter with:

A-Reg containing the number of contiguous pages to be found.

Return with:

If the carry bit is clear:
A-Reg contains the page number of the lowest page of the group of pages, a value in the range $20 - $BE.
If the carry bit is set:
A-Reg contains $0C, the error code for "No Buffers Available".
A, X, and Y registers intact.

TABLE 2

DESCRIPTION OF CKMAP:

Checks the status of the system bit map for any requested page of memory.

Enter with:

A-Reg containing the page number to be examined.

Return with:

Carry clear: requested page is free
Carry set: requested page is busy
A, X and Y registers intact.

TABLE 3

DESCRIPTION OF SETMAP:

Sets or clears bits in the system bit map for a requested group of

contiguous pages of memory.

Enter with:

A-Reg containing the number of pages to be reserved or relesed.
If high bit is off, pages in the bit map will be reserved (bit map bits set on). If high bit is off, pages in the bit map will be released (or at least the bit map bits will be reversed).
X-Reg containing the page number of the lowest page to be marked.

Return with:

System bit map altered.
A, X and Y registers intact.

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Memory Management Routines

```
BITMAP   GEQU   $BF58          PRODOS SYSTEM BIT MAP

GETBUF   START                 GET BUFFER ROUTINE
         STA    WRK
         LDA    #0
         PHA
         LDA    #$BE           SEARCH START PAGE
AGN      STA    WRK+1
         JSR    CKMAP
         BCC    FRE
         PLA                   PAGE IN USE
         LDA    #0             RESTART COUNT
         PHA
NXT      LDA    WRK+1
         DEA
         CMP    #$20           BOTTOM OF MEMORY
         BCS    AGN
         PLA
         LDA    #$0C           NO BUFFS AVAILABLE
         SEC
         RTS
FRE      PLA
         INA
         PHA
         CMP    WRK            REQUESTED # PAGES  FOUND?
         BCC    NXT            NOT YET
         PLA
         LDA    WRK+1          RETURN LOWER PAGE NUMBER
         CLC
         RTS
WRK      DS     2              WORK AREA
         END

CKMAP    START                 CHK FREE MEM IN BIT MAP
         PHA
         PHX
         PHY
         CMP    #$C0           CHK RESERVED MEM
         BCS    BUSY
         TAX
         LSR    A
         LSR    A
         LSR    A
         TAY                   BYTE IN BIT MAP
         TXA
         AND    #$7
         TAX
         LDA    #$80
LUP1     DEX
         BMI    CKMP
         LSR    A
         BRA    LUP1
CKMP     AND    BITMAP,Y       CHECK BIT IN BYTE
         BNE    BUSY
         CLC                   REQUESTED PAGE IS FREE
         BRA    EXIT1
BUSY     SEC                   REQUESTED PAGE NOT FREE
EXIT1    PLY
         PLX
         PLA
         RTS
         END

SETMAP   START                 SET  SYSTEM BIT MAP
         PHA
         PHX
         PHY
         BPL    SET            PLUS = SET/MINUS= CLEAR
         AND    #$7F
         PHA
         LDA    #$59           EOR ABS,Y
         BRA    CHNGOP
SET      PHA
         LDA    #$19           ORA  ABS,Y
CHNGOP   STA    CHNG
         TXA                   BEGINNING PAGE ADDRESS
BIGLUP   STA    WRK
         TAX
         LSR    A
         LSR    A
         LSR    A
         TAY
         TXA
         AND    #$7
         TAX
         LDA    #$80
LUP2     DEX
         BMI    CHNG
         LSR    A
         BRA    LUP2
CHNG     ORA    BITMAP,Y       CHANGE BIT MAP
         STA    BITMAP,Y
         PLA
         DEA
         BEQ    EXIT2
         PHA
         LDA    WRK
         INA
         BRA    BIGLUP
EXIT2    PLY
         PLX
         PLA
         RTS
WRK      DS     1              WORK AREA
         END
```


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The Spreadsheet Sheet: Tracking Investments

Jeffrey M. Jacques

In this article, we will explore how you can use your favorite spreadsheet software to keep track of your money. While we have covered several applications in previous articles, e.g., budgeting, tax, and checkbook templates, we have not handled investment tracking. Minimally, an investment tracking template should:

1) keep track of each investment's original price,
2) enable easy updating of the current market price,
3) convert the raw data to appropriate statistics which help us make decisions about the investment, and
4) summarize the original data

Recently I received a letter concerning this subject from one of our members, Hal Blackmon of Ft. Worth, Texas. He included a spreadsheet worksheet similar to that presented in Table 1. Clearly, he has thought through the information he wishes to keep about each investment (i.e., original price and current price of each investment fund) and how he wishes to analyze (i.e., computing percent change from original price and percent change across each week), organize (i.e., a set of three columns for each fund) and summarize (i.e., summary data are presented in rows 24 through 33) his investments.

The Problem

This worksheet is fairly typical of those I receive with a letter asking for help. In this case, Hal wanted to know how he could "automatically update the summary for each new week when weekly price entries are made." He went on to note that he "would like to enter the price of each fund each week and have all the sheet (cells) automatically updated." Apparently, as with many worksheets, he was /Inserting a new row for each week and then resetting the cell references in the summary section of his table (cells B30 through C31). Finally, he noted that the worksheet was developed using THE Spreadsheet software.

It seemed to me that this was a reasonable request. It would, furthermore, serve as a useful illustration of how to move from a worksheet to a template. It also provides several opportunities to illustrate the use of some interesting and powerful functions—often those functions assiduously avoided by those who could profit most from their use.

The Solution

Whenever you wish THE Spreadsheet, or any other spreadsheet software, to do something "automatically," you will probably have to develop a template. While I have discussed the general rules for building templates elsewhere (see "Issues in Using Spreadsheets – Not for Beginners Only," *Call - A.P.P.L.E.*, May through July, 1986), it bears repeating that whenever you have a task which requires repetitive access of the same spreadsheet worksheet, and your work requires a running account of information which uses mathematical manipulation, a template is the best way to go. Thus, we should be able to convert Hal's worksheet to a template without too much effort.

Step 1.

Determine the best organization of the spreadsheet. Here I will assume that Hal would wish to keep the structure he developed in his worksheet. This is okay with me since any template should be consistent with how the user wishes to enter data, make the appropriate computations, and present the results.

Of course, in building a template we shall have to add some information and computational routines, but we can place these routines in an inconspicuous place and be consistent to the structure Hal established.

Step 2:

Determine if all the data and formulae are present. Again, I will assume here that Hal has identified all the important variables and useful statistics. While my friends in the world of high finance tell that that such a template should have additional statistics (e.g., a column to help identify when to sell the shares), I will use his variables and formulae.

What may not be so obvious, but is missing from the worksheet, is that there is insufficient space for all data entries to be made easily. Right now, the organization of the worksheet requires him to /Insert a new row each week. A template requires a different approach, to wit: there should be sufficient room to make all essential entries. We shall extend the number of rows so that all possible weekly entries may be made. Of course, this provides an additional advantage since we shall only have to /Replicate the formulae once and transfer them through columns C and D; F and G, etc.

Step 3:

Determine how best to "automate" the template. Or, now that I know that there is sufficient room in the worksheet area to enter the weekly prices for each fund, how can I "automatically" identify and summarize the most current results? (Go ahead and take a few minutes to think about this question.).

While it may not be immediately obvious, we can accomplish our "automation" goal by carefully combining and using several functions. My approach includes the use of these functions:

1 **@NA**
2 **@ISNA**
3 **@SUM**
4 **@CHOOSE**
5 **@IF**

To start with, we can fill in the "Price" column of each fund with the expression @NA. That is, every row in these columns should begin with the insertion of @NA. Of course, as each weekly price is determined, we shall substitute the new price where @NA was listed first.

Now, since @NA is treated as a value, we can check to see if @NA is present (i.e., using the @ISNA function) or if a value was entered (i.e., the current weekly price). This can be accomplished with an @IF expression, such as:

@IF(@ISNA(B15),0,1)

Basically, IF cell B15 contains @NA, then return the value of 0, else, return a value of 1. By setting aside an additional column for each fund in an out of the way worksheet area (see columns I and J, rows 11 through 23, in Table 2, "FUND.TRACKING.TMP"), we can determine if a value replaced the @NA function for each week. Where a value (i.e., price for Fund A) was entered in column B, a value of 1 would be returned on the same row in column I. Similarly, column J checks the cell contents for Fund B, column E. Now, that's not too tough.

But here's the kicker which may not be so obvious. The easiest way to determine the total number of values entered for each fund is simply to @SUM all the values in these computational columns. The @SUM function in cell I26 does this very nicely for Fund A and the @SUM function in cell J26 does this for Fund B. These summated values, then, identify the total number of entries for each fund. See Table 2.

Now, in order to automate the report and summarize the data, we must be able to use this summated value as a reference to find and display the most current percent changes, columns C and D for Fund A and columns F and G for Fund B. Actually, this is really quite simple and elegant. Simply use the @CHOOSE function. That is, in cell B36, enter the expression:

@CHOOSE(I26, C11...C23)

Based on the summated value returned in cell I26, read down Column C, starting with row eleven, and return the value stored in referenced cell.If six weeks of prices have been entered, then return the value stored in cell C16 and display it in cell B36. Similarly, the expression in cell C36:

@CHOOSE(I26,D11...D23)

TABLE 1. TRACKING OF FUNDS INITIAL WORKSHEET

	A	B	C	D	E	F	G
1							
2							
3				"original worksheet"			
4							
5			FUND A			FUND B	
6	Week						
7		Price	% Change	Weekly	Price	% Change	Weekly
8			from Buy	Change		fromBuy	Change
9							
10							
11	1	16.02	0.00	0.00			
12	2	15.02	-6.24	-6.24			
13	3	18.03	12.55	20.04			
14	4	19.50	21.72	8.15			
15	5	20.00	24.84	2.56			
16	6	21.00	31.09	5.00			
17	7						
18							
19							
20	%change from Buy = (new price/original price)-1* 100						
21							
22	% weekly change = (new price/old price)-1* 100						
23							
24			Summary				
25			Week 6				
26							
27	Fund		Total		Weekly		
28			Change	Change			
29							
30	A		31.09	5.00			
31	B		+F16	+G16			
32	etc.						
33							
34							

TABLE 2

	-A-	-B-	-C-	-D-	-E-	-F-	-G-	-H-	-I-	-J-
1										
2									"Computatio	"nal Space
					O					
3					"Tested Tem	"plate				
					m					
4	/-=	/-=	/-=	/-=	/-=	/-=	/-=		/-=	/-=
5	/FR "	/FR "	/FR "FUND	/FR "	/FR "	/FR "	/FR "		"Is there	" Value fo
			A			B			a	r
6	/FR "Week	/--	/--	/--	/--	/--	/--		/--	/--
7	/FR/ "	/FR "Pric	/FR "% Ch	/FR "Week	/FR "Pric	/FR " Ch	/FR "Week		/FR "FUND	/FR "FUND
		e	ange	ly	e	ange	ly		A	B
8	/FR "	/FR "	/FR "from	/FR "Chan	/FR "	/FR " rom	/FR "Chan			
			Buy	ge		Buy	ge			
9	/--	/--	/--	/--	/--	/--	/--		/--	/--
10										
11	/FI 1	/AV@NA	0	0		0	0		@IF(@ISNA(B1	@IF(@ISNA(E1
									1),0,1)	1),0,1)
12	/FI 2	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B12),B11=0)	(B12),B11=0)		(E12),E1 =0)	(E12),E11=0)		2),0,1)	2),0,1)
			,@ISNA,((B12/B1	,@ISNA,((B12/B1		,@ISNA,((E1 /E1	,@ISNA,((E12/E1			
			1)-1)*100)	1)-1)*100)		1)-1)*10)	1)-1)*100)			
13	/FI 3	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B13),B11=0)	(B13),B12=0)		(E13),E1 =0)	(E13),E11=0)		3),0,1)	3),0,1)
			@ISNA,((B13/B1	,@ISNA,((B13/B1		,@ISNA,((E1 /E1	,@ISNA,((E13/E1			
			1)-1)*100)	2)-1)*100)		1)-1)*10)	1)-1)*100)			
14	/FI 4	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B14),B11=0)	(B14),B13=0)		(E14),E1 =0)	(E14),E11=0)		4),0,1)	4),0,1)
			,@ISNA,((B14/B1	@ISNA,((B14/B1		,@ISNA,((E1 /E1	,@ISNA,((E14/E1			
			1)-1)*100)	3)-1)*100)		1)-1)*10)	1)-1)*100)			
15	/FI 5	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B15),B11=0)	(B15),B14=0)		(E15),E1 =0)	(E15),E11=0)		5),0,1)	5),0,1)
			,@ISNA,((B15/B1	,@ISNA,((B15/B1		,@ISNA,((E1 /E1	,@ISNA,((E15/E1			
			1)-1)*100)	4)-1)*100)		1)-1)*10)	1)-1)*100)			
16	/FI 6	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B16),B11=0)	(B16),B15=0)		E16),E1 =0)	(E16),E11=0)		6),0,1)	6)0,1)
			,@ISNA,((B16/B1	,@ISNA,((B16/B1		,@ISNA,((E1 /E1	,@ISNA,((E16/E1			
			1)-1)*100)	5)-1)*100)		1)-1)*10)	1)-1)*100)			
17	/FI 7	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B17),B11=0)	(B:7),B16=0)		(E17),E1 =0)	(E17),E11=0)		7),0,1)	7),0,1)
			,@ISNA,((B17/B1	,@ISNA,((B17/B1		,@ISNA,((E1 /E1	,@ISNA,((E17/E1			
			1)-1)*100)	6)-1)*100)		1)-1)*10)	1)-1)*100)			
18	/FI 8	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B18),B11=0)	(B18),B17=0)		(E18),E1 =0)	(E18),E11=0)		8),0,1)	8),0,1)
			,@ISNA,((B18/B1	,@ISNA,((B18/B1		,@ISNA,((E1 /E1	,@ISNA,((E18/E1			
			1)-1)*100)	7)-1)*100)		1)-1)*10)	1)-1)*100)			
19	/FI 9	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B1	@IF(@ISNA(E1
			(B19),B11=0)	(B19),B18=0)		(E19),E1 =0)	(E19),E11=0)		9),0,1)	9),0,1)
			,@ISNA,((B19/B1	,@ISNA,((B19/B1		,@ISNA,((E1 /E1	,@ISNA,((E19/E1			
			1)-1)*100)	8)-1)*100)		1)-1)*10)	1)-1)*100)			
20	/FI 10	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B2	@IF(@ISNA(E2
			(B20),B11=0)	(B20),B19=0)		(E20),E1 =0)	(E20),E11=0)		0),0,1)	0),0,1)
			,@ISNA,((B20/B1	,@ISNA,((B20/B1		,@ISNA,((E2 /E1	,@ISNA,((E20/E1			
			1)-1)*100)	9)-1)*100)		1)-1)*10	1)-1)*100)			
21	/""		/""	/"		/"	/"		/""	/""
22			/""	/""		/""	/"		/""	/""
23	"Maximum #	/AV@NA	@IF(@OR(@ISNA	@IF(@OR(@ISNA		@IF(@OR(SNA	@IF(@OR(@ISNA		@IF(@ISNA(B2	@IF(@ISNA(E2
			(B23),B11=0)	(B23),B22=0)		(E23),E1 =0)	(E23),E11=0)		3),0,1)	3),0,1)
			,@ISNA,((B23/B1	,@ISNA,((B23/B2		,@ISNA,((E2 /E1	,@ISNA,((E23/E1			
			1)-1)*100)	2)-1)*100)		1)-1)*10)	1)-1)*100)			
24										
25	/--	/--	/--	/--	/--	/--	/--		/--	/--
26	%change f	"rom Buy =	"(new pric	"/original	"price)-1*	"100			SUM(I10:I24)	SUM(J10:J24)
27										
28	"% weekly c	hange =	"(new price	"/old price	)-1* 100					
29										
30		"Summary								
31	"Maximum #	"Weeks =>	{L} I26							
32	/--	/--	/--							
33	Fund	"Total	"Weekly							
34		"Change	"Change							
35	/--	/--	/--							
36	"A	@CHOOSE(I	@CHOOSE(I							
		26,C11...C23	26,D11.D23							
		)	)							
37	"B	@CHOOSE(J	@CHOOSE(J							
		26,F11...F23	26,G11.G23							
		)	)							
38	"etc.									
39	/--	/--	/--							

LEGEND:/-= or /-- are repeating labels/FI indicates integer format/FR indicates right justified format/FL indicates left justified format/AV indicates attribute command (values) in effect. **Global Commands:** /F$ indicating dollar format for all values/ GAP indicating protection of all cells, except those with /AV in effect. **Note:** You will have to /Insert a number of additional rows in order to cover the a ppropriate number of weeks. Then /Replicate those formula you need.

reports the most current "Weekly Change" percent. Finally, each additional fund current totals may be captured in a similar manner and reported in this summary table. See cells B37 and C37. This is a nice solution to the problem presented by Hal.

When Working with Templates

As we have noted elsewhere, whenever you are working with templates and you are working with a formula that includes division, you should get into the habit of checking for 0 values. The percent change (either from the original price or from the current price) formulae in this template are a good example of such a need. This can be checked with the expression:

@IF(B12=0,0,(B12/B11)-1*100)

So, if B12 has a value of 0 entered, then return a value of 0, otherwise compute the percent change. But, we have entered the function of @NA in many of the cells in column B. Well, this is easily satisfied by incorporating a logical @OR test within the @IF expression:

@IF(@OR(ISNA(B12),B11=0),
@NA,(B12/B11)-1*100

Now, we can check for either a value of 0 or a value of @NA in cell B12. By simply /Replicating this expression through column B, remembering to answer Relative for B12 and No change for B11, we can easily perform the other weekly calculations and note the percent change from the original purchase price. Similarly, we can /Replicate this expression to column D, remembering to answer Relative for both B12 and B11, and compute weekly change percents. If necessary, row 12, columns C and D can be /Replicated to columns F and G for Fund B, and any additional Funds. Thus, we can complete our template within an hour and continue to use it to automatically update as many funds as we have with minimal effort.

But updating information sometimes causes errors. We can reduce the likelihood of errors by using the /Attribute command and Protecting all cells except those in column B or column F—our weekly price information. Thus, THE Spreadsheet will beep at us if we try to enter a value in a protected cell. This will minimize the likelihood of making a data entry error.

One or two more words are necessary about this template. First, make sure that the order of calculation is R(OW) and not C(olumn.) Otherwise you will have to press the recalculation command twice in order to get the correct results. Second, try to get into the habit of appropriately formatting your entries. Your weekly number should be integers while your dollar values and perhaps your percents should be formatted as dollar values. Similarly, try to right justify most column labels. This will make it easier to read the output and what is in each column.

I have included a table of test data, Table 3, so that you might check your results. Of course, you can simply /Replicate row 20 as many times as necessary to complete the maximum number of weekly entries you plan to make. This should now be pretty routine.

Fund Table 2 Continued

Legend: F Formula + Number " Text ' Repeat b blank

	A	B	C	D	E	F	G	H	I	J
1	"									
2	"				"	"			"	"
3					"	"				
4	'	'	'	'	'	'	'		'	'
5	b	b	"	b	b	"	b		"	"
6	"	'	'	'	'	'	'	b	'	'
7	b	"	"	"	"	"	"		"	"
8	b	b	"	"	b	"	"			
9	'	'	'	'	'	'	'		'	'
10										
11	+	+	+	+		+	+		F	F
12	+	+	F	F		F	F		F	F
13	+	+	F	F		F	F		F	F
14	+	+	F	F		F	F		F	F
15	+	+	F	F		F	F		F	F
16	+	+	F	F		F	F		F	F
17	+	+	F	F		F	F		F	F
18	+	+	F	F		F	F		F	F
19	+	+	F	F		F	F		F	F
20	+	+	F	F		F	F		F	F
21	'		'	'		'	'		'	'
22	'		'	'		'	'		'	'
23	"	+	F	F		F	F		F	F
24										
25	'	'	'	'	'	'	'		'	'
26	"	"	"	"	"	"			F	F
27										
28	"	"	"	"	"					
29										
30	b	"								
31	"	"	F							
32	'	'	'							
33	"	"	"							
34		"	"							
35	'	'	'							
36	"	F	F							
37	"	F	F							
38	"									
39	'	'	'							

Suggested Modifications

A template like this can be modified easily for as many funds or stocks you wish to track. Simply set aside three columns for each fund and then replicate the expressions from an earlier fund, remembering which values are Relative and No Change. Of course, before entering additional funds, my friends would suggest additional running statistics such as finding the peak value of the fund and the percent loss from that fund

If, for example, you wish to sell the

TABLE 3

	A	B	C	D	E	F	G	I	J
1									
2								Computational Space	
3			Tested Template						
4									
5			FUND A				FUND B	Is there a Value for	
6	Week								
7		Price	% Change	Weekly		Price	% Change	Weekly	FUND A	FUND B
8			from Buy	Change			from Buy	Change		
9									
10									
11	1	16.02	0.00	0.00	NA	0.00	0.00	1.00	0.00	
12	2	15.02	-6.24	-6.24	NA	NA	NA	1.00	0.00	
13	3	18.03	12.55	20.04	NA	NA	NA	1.00	0.00	
14	4	19.50	21.72	8.15	NA	NA	NA	1.00	0.00	
15	5	20.00	24.84	2.56	NA	NA	NA	1.00	0.00	
16	6	21.00	31.09	5.00	NA	NA	NA	1.00	0.00	
17	7	24.00	49.81	14.29	NA	NA	NA	1.00	0.00	
18	8	25.00	56.05	4.17	NA	NA	NA	1.00	0.00	
19	9	NA	NA	NA	NA	NA	NA	0.00	0.00	
20	10	NA	NA	NA	NA	NA	NA	0.00	0.00	
21									
22									
23	52	NA	NA		NA	NA	NA	NA	0.00	0.00
24									
25									
26	%change from Buy = (new price/original price)-1* 100 8.00 0.00									
27									
28	% weekly change = (new price/old price)-1* 100									
29									
30	Summary									
31	Maximum # Weeks => 8									
32									
33	Fund	Total	Weekly							
34		Change	Change							
35										
36	A	56.05		4.17						
37	B	NA		NA						
38	etc.									
39										
40										

fund when it falls ten percent from the highest weekly value, you can add a column to do this. Just give it a little thought on how to use the @MAX function within an @IF statement, and /Replicate the expression throughout the rest of the column. Go ahead and try.

Conclusion

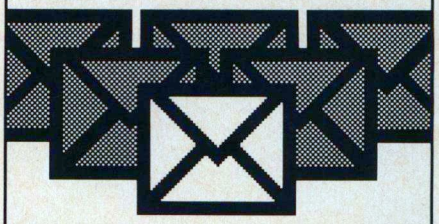
In this article we have explored one technique for keeping track of our money. Equally important to some, we have noted how you can convert a simple worksheet to a template which will "automate" the updating of summary information and important statistics.

Next time we shall look at a different kind of application. See ya then.

Please rate this article on the Reader Service Card:

121 Excellent **122** Good
123 Fair **124** Poor

LETTERS POLICY



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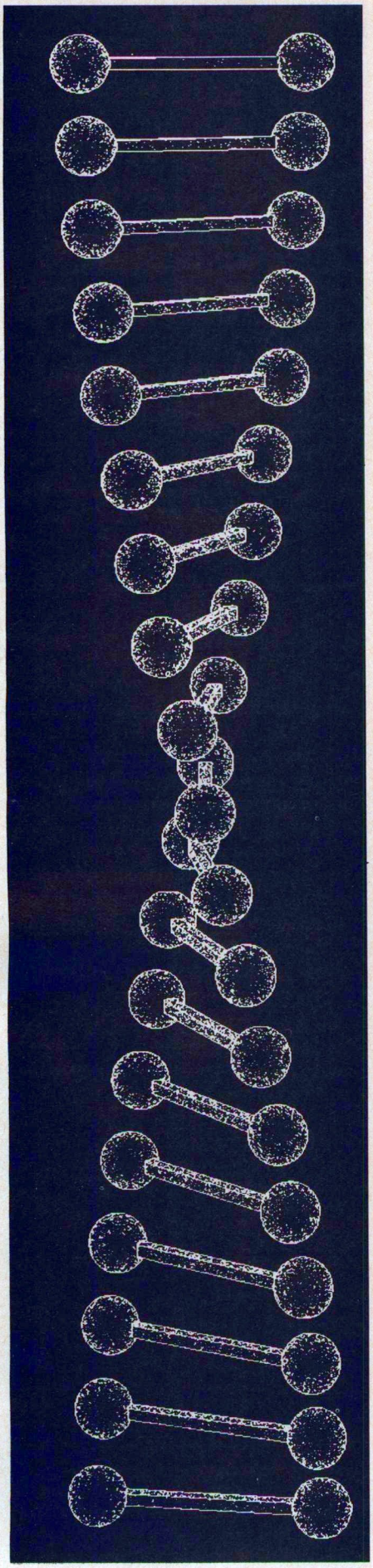

Silicon Intelligence:

Smalltalk and Object Logo

Michael and Lisa Storrie-Lombardi

Sorry to miss you last month but we just got ourselves totally overloaded. We shall try to make it up to you by covering a few more points about **Smalltalk-80** (available through *Apple Programmer's and Developer's Association*) and then take a look at a new and exciting derivative of Smalltalk's object-oriented style: **Object Logo.**

Smalltalk

Last time, we reviewed some of the basic differences between the "Mac Look" and Smalltalk's multiple window and multiple menu presentation. We covered the System Transcript and Workspace Windows, and then mentioned a window called **System Browser** (see Figure 1). The Browser takes its name from the metaphor of browsing through the different levels of code in Smalltalk. Remember that object-oriented programming means we have a class structure complete with inheritance of methods from superclasses to subclasses. Smalltalk makes no artificial distinction between the "program" you write and the "system". When you write a piece of code, you literally extend the system itself. As a result, you need the capability of bouncing or browsing up and down the class structure to imbed your code within the existing system structure.

Looking at the Browser schematic in Figure 1, we see four different lists or menus. We can scroll up and down these lists just like we can in any other window in Smalltalk. Each has its own submenu to manipulate selected items. The large window below the top four serves as a workspace and will exhibit text that concerns the most specific class selected. Notice that the broadest categories appear in the left-most of the four windows and then get more specific as we move to the right. The left-hand window shows us all of the general class categories. If we select one of those categories, a list of the classes already found in that category appears in the next window. Look at Figure 2 and you will see we have selected the class category "Kernal-Objects". In the next window, two of the several classes in this category appear, "Boolean" and "Object". We could scroll up and down in this window to find other classes assigned to the category "Kernal-Object". Once we select a class, we can then either review the characteristics of the

class as a whole or review particular instances of the class by clicking on the instance or class toggle.

In Figure 2, you will see how we create a new instance of the class Objects, called "games". First, we have asked for a list of the instances of "Objects" and then entered a new Message Category called "games". At this point, if we wanted to start designing a series of games we would simply enter five elements into the large workspace. First a message selector such as **myGameNumber1**. Then we would add any argument names such as **leftField from:** and **rightField to:**. Thirdly, we would add a set of comments inside double quotation marks to clearly describe our new method in human language. Next, we would add all the temporary variable names, enter a series of double quote instructions to tell us later how to use this message, and then close with a method for activating the message from within the work space to allow a test run.

For an example of a completed message look at Figure 3. We have selected the Graphics-Primitive category, pen class, defined a new message category called "examples" and entered a specific example that will draw a gray spiral with a 1 pixel wide pen. To draw the spiral, we simply select the name "pen example" at the bottom of the work space. We then move to the left or right side of the workspace, watch for the miniature menu icon to appear, hold down the mouse button, select "do It", and release the button to draw the spiral. If we like what we see, then we select "accept" and the example will become part of our current system. When we get ready to close down, Smalltalk will ask if we wish to save any changes made during the working session. If we say yes, our modified system photographs itself and when we open again Smalltalk would return us to this exact workspace, right where we left off working on our message.

Object Logo

Two weeks ago we got our first look at the newest entrant into the world of object-oriented languages. **Object Logo** from *Coral Software Corporation* elegantly exhibits many of the classic characteristics of object-oriented programming (protected objects, close alliance of objects, functions, and data), but it also shows how rapidly the original concepts spawned by Smalltalk have continued to evolve. Object Logo has also inherited a rich vocabulary from the last decade of work on other Logo dialects in the educational community. Object Logo comes on one 400K disk. The program itself takes up about 289K, plus another 35K for examples and tools. We ran it on a Mac Plus with a DataFrame 20.

The manual will win you over at first glance: large, extremely well organized, clearly delineates syntactic differences between accustomed Logo style and the object-oriented style, and has an excellent reference. Do not expect the manual to serve as an introductory course in Logo or in object-oriented pro-

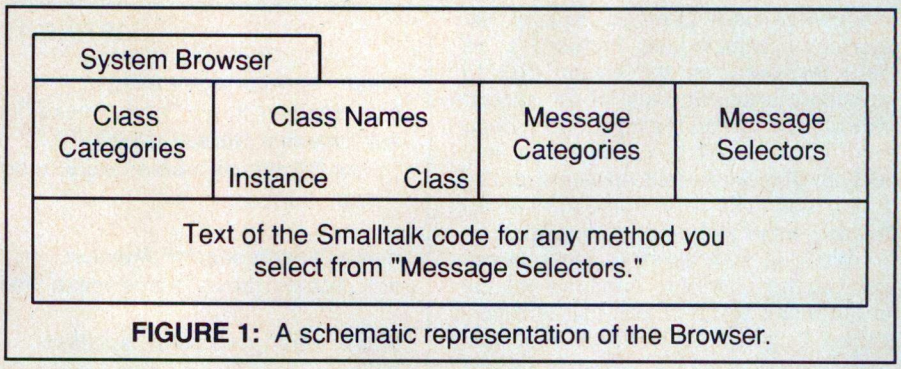

FIGURE 1: A schematic representation of the Browser.

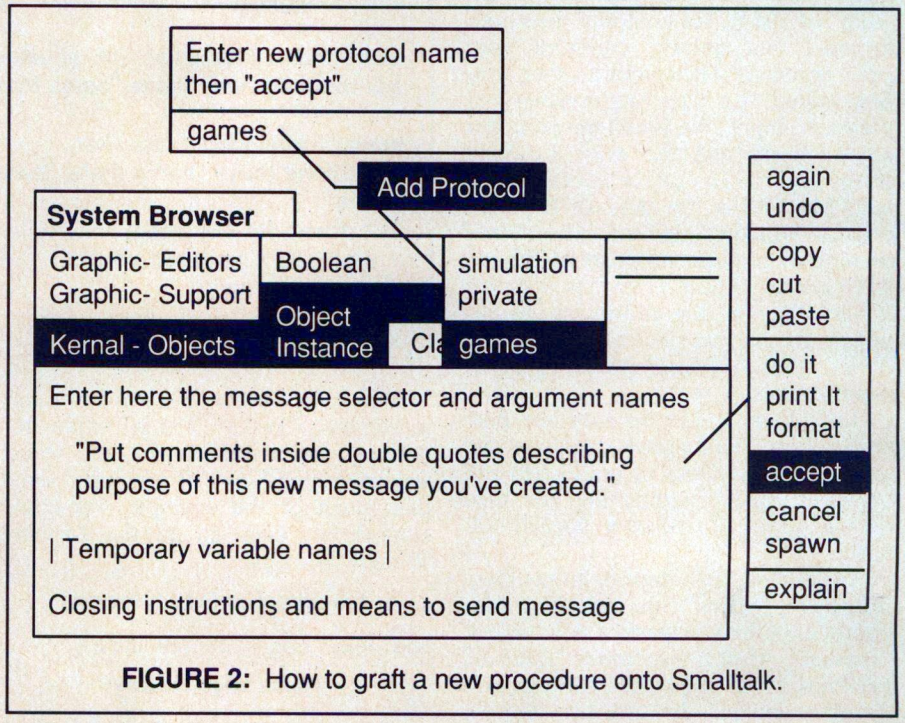

FIGURE 2: How to graft a new procedure onto Smalltalk.

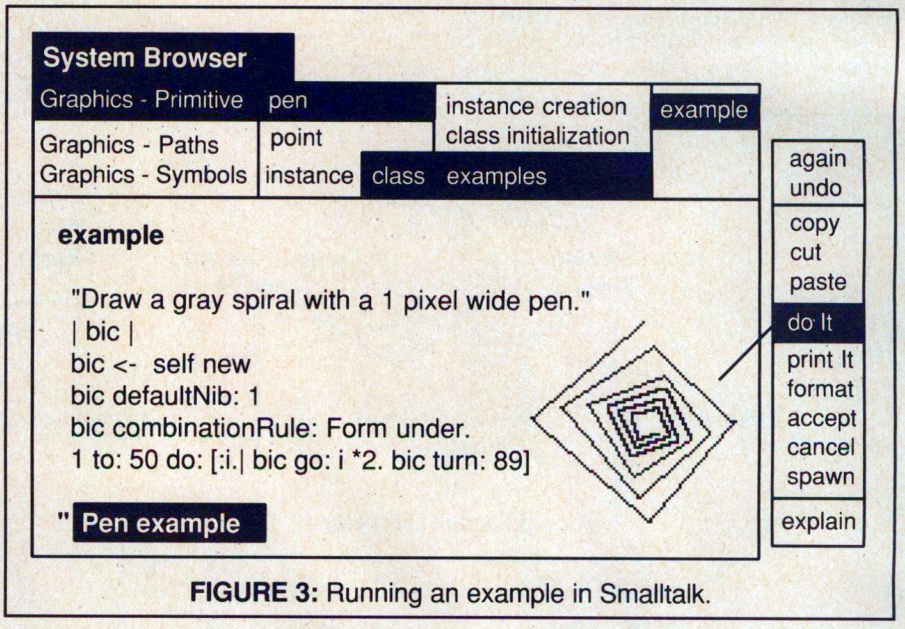

FIGURE 3: Running an example in Smalltalk.

gramming. Gary Drescher, one of the original designers, has included a 14 page document on the system disk to provide a brief overview of the special characteristics delineating Object Logo from other Logos. If you start out new to both object-oriented concepts and to Logo, you will need some of the references listed at the end of this article.

Working with the language, you can keep multiple editing windows on the desktop and act as if you had an interpreted language in front of you. Just make your program changes, select "Run" or ctrl-R, the compiler then goes to work and quickly compiles your latest revisions. Then enter another window called "Listener" to review your program output. We found the compiler quick, clean, and the error handling seems superb. The editor interacts well with MockWrite. In fact, we kept numerous windows up and MockWrite running to produce this part of Silicon Intelligence. Object Logo has a global Revert function that allows you to eliminate all changes since your last Save, if you change your mind about your modifications.

Let's look at Listing 1 to see how Object Logo demonstrates some of the classic characteristics of both Logo and object-oriented programming and then review some of its own special advances.

In Listing 1 (adapted from Gary Drescher's "talker"), the primitive function "something" creates a new object, "speaker". As of this moment, "speaker" becomes a real object in Object Logo's environment and, in turn, has its own protected environment. The primitive "have" gives the object speaker its own version of a variable, in this case "name". We now let the primitive "make" give the variable name a value, in this case "Taska". The primitive "to" defines a new function for the object speaker called "say". If we just entered that much of the example, we could compile it, then go to the Listener Window and type

```
ask :speaker [say "Howdy.]
```

and Object Logo would produce

```
Taska says Howdy.
```

We can change this object "speaker" to class status by simply invoking the "kindof" function to make a series of speakers (friend, enemy, acquaintance, stranger), each with their own name. We can now give each of those speakers the attributes of the class speaker, but also add special attributes specific only to the individual instance of the class. For example, in Listing 1 we have taken the object "friend" and modified what friend will say with the procedure

```
ask :friend [to say :msg]
    type [Gosh I missed you!]
    usual.say :msg
    end
```

by invoking the primitive "type" to insert a phrase [Gosh I missed you!] and then telling it to produce the usual mes-

LISTING 1: speakerDemo

```
make "speaker something
ask :speaker [have "name make "name "Taska]
ask :speaker [to say :msg]
  print (sentence :name "says :msg)
  end

make "enemy kindof :speaker
ask :enemy [have "name make "name "Etia]

make "stranger kindof :speaker
ask :stranger [have "name make "name "Christopher]

make "acquaintance kindof :speaker
ask :acquaintance [have "name make "name "Mary]

make "friend kindof :speaker
ask :friend [have "name make "name "Minerva]

ask :friend [to say :msg]
   type [Gosh I missed you! ]
   usual.say  :msg
   end
```

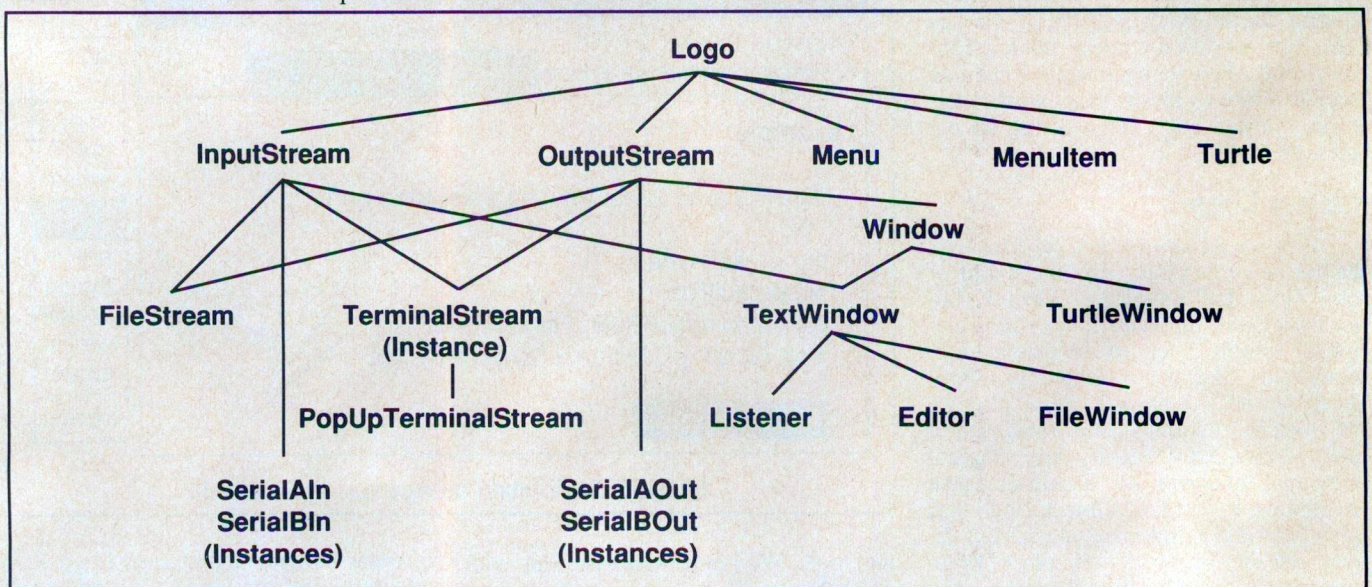

FIGURE 4: Object Logo System Object Heirarchy (from *ObjectLogo* by Coral Software, 1987

sage (notice you use squared brackets to delineate a phrase, single quotes can handle a single word).

If you now typed into the Listener

ask :friend [say "Howdy.]

Object Logo would get friend to meld its own special characteristics with the characteristics it inherited from its parent "speaker" to produce

Gosh I missed you! Howdy.

We could go on at this point and change the specific instance "Minerva" to another subclass, and so on. If you think it looks easy, we agree. The hierarchy structure makes so much sense that Object Logo can easily describe itself in a similar fashion. Look at Figure 4 and you can see the rather marked simplification in understanding how a Macintosh program flows together. Any of you who have labored through Inside Macintosh will particularly appreciate Figure 4. The manual does an excellent job of taking you through the hierarchy step by step. It makes organizing your program development much simpler.

Object Logo deviates from the strict message-passing syntax of Smalltalk and its close derivatives. Strict message passing languages define the currently active object as a variable "self" and then self passes messages to itself when it wants itself to do something. Just as that sentence sounds complicated, so does some of the earlier object-oriented syntax. In Object Logo all function and variable references operate as implicit messages to "self", i.e., the current object. Except for very theoretical work this simplification of syntax makes reading and understanding your program much less cumbersome.

Object Logo also varies from traditional Logo dialects in the way it handles and protects variables. Most Logo dialects use dynamic scoping, meaning that if a procedure defines a variable, then any of its subprocedures can access that variable. About six months ago, we introduced you to the power of lexical scoping in our review of MacScheme, an excellent implementation of Scheme that uses a lexically scoped Lisp dialect. In lexical scoping a subprocedure may not access a local variable belonging to the parent procedure. Unless otherwise instructed, Object Logo performs as a lexically scoped language with four classes of variables:

Local Variable: Accessible from its own procedure; ephemeral; disappears when the procedure stops and the procedure must create it again at next invocation.

Public Variable: Accessible from its own procedure and from any procedure called in any manner by the parent procedure unless the called procedure has a local variable of the same name.

Object Variable: Accessible only in the object owning it and the descendents of that object unless a local variable of the same name appears.

Global Variable: Accessible from the top of the hierarchy to down through every object and procedure unless any object or procedure has a local, public, or object variable of the same name.

The addition of lexical scoping adds power and flexibility not available in dynamically scoped implementations.

We shall not have time or space to go through all of Object Logo, but expect to see lots more in the next several issues. After our brief look, we find that we really like the following things about Object Logo:

- Excellent documentation.
- Clear demonstration.
- Very readable language, particularly if you know any other Logo or Lisp.
- Powerful Lexical Scoping rules.
- Excellent array handling.
- Toolbox access makes graphics handling a breeze, while the addition of a number of list handling and parsing primitives makes manipulating lists and human language interfacing a reality.
- Excellent price ($79.95 retail).

Wish List

We talked to Philippe Krakowsky at Coral Software just as this article headed for the presses. It looks like they already have plans or have at least started talking about the three things of most interest to us:

- Stand Alone Package — Under discussion and will probably happen as soon as they dig out from the onslaught of interest in this first release of Object Logo.
- MacInTalk capability — included in the next update.
- Midi Interface — already underway; release date uncertain.
- Video Interface — already underway; release date uncertain.
- A version to run on the Apple IIGS — under discussion; most likely.
- A version in Lisp — Coral Software will soon release a subset of Common Lisp called Coral Lisp (price $99.95). Expect a full implementation of Common Lisp for stand-alone development later in the year.

Updates and Customer Service

Although Object Logo only surfaced about 6 weeks ago, the first update (probably with speech capability) will have appeared before you read this article. The folks at Coral Software have responded quickly, efficiently, and graciously to our inquiries. We expect this company to go a long way.

As many of you know, we have looked for the past year for a language common to the Mac and the Apple II that lends itself to looking at Artificial Intelligence concepts. Even before the appearance of Object Logo, we had seriously considered using some version of Logo on the Mac and some version from the Apple II world to provide a common reference ground. We just could never find one on either machine elegant enough, fast enough, and robust enough to let us do anything really interesting. When we realized the "hot spot" of interest in programming had started swinging into the object-oriented world, we feared it would take even longer to find a fast, object-oriented language capable of handling graphics and English syntax, running on both machines, and not costing an arm and a leg. With the appearance of Object Logo, it looks like we may have gotten a lot closer than we could have hoped.

Between now and next time we shall take a closer look at Object Logo's speed (we'll dump some of Lisa's physics matrices in and see if it smokes). Take a look at the program and let us know what you think. We'll keep you updated on revisions and enhancements. See you next month.

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For more information on:

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Object Logo and Coral Software

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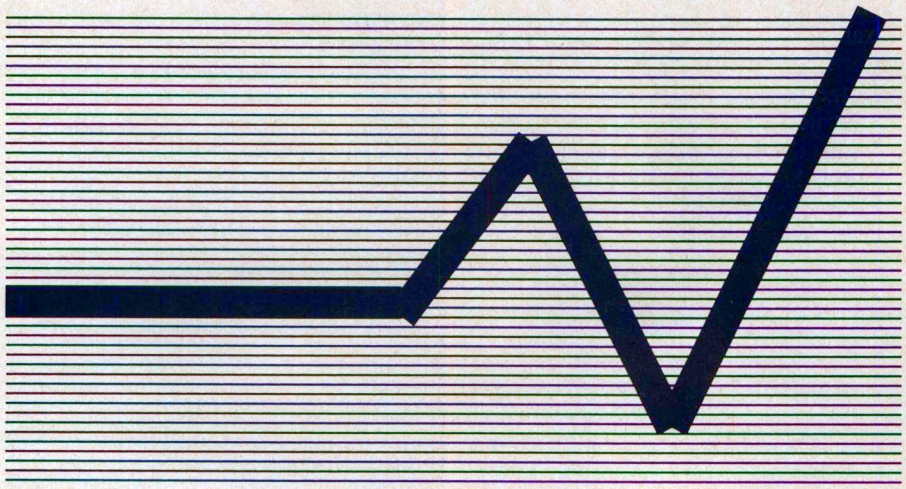

Bruce F. Field / Robert C. Pratt

LOSING DATA

A letter I received recently from Mel Holliday has some more information about losing data on track 0. For those of you joining this serial in the middle, a number of people have had problems with ProDOS trashing track 0. The problem has been reported extensively here and observed elsewhere. Some people have claimed the problem is due to bad Apple power supplies and most recently Stephen Thomas reported that it is due to a bug in ProDOS. A patch program written by Stephen for ProDOS version 1.1.1 was published in Tom Weishaar's *Open Apple* that is supposed to solve the problem. Other people have reported that there are three versions of ProDOS labeled 1.1.1, and the bug has reportedly been corrected in the 18-Sep-84 version. However, see the last question in this column. Also, Mel writes:

"I have been following the discussion in *Open Apple* (and *Call -A.P.P.L.E*) on losing data in track 0. Most have indicated it is *only* in ProDOS that this happens. I disagree. I have lost data in DOS 3.3 and so have may other people that I work with. Some have used older Apple IIe's as well as newer ones. I changed my power supply and have not lost any data since that time. I have advised my co-workers to do the same."

Thanks Mel. What can I add? We may have two problems here that produce similar symptoms, one caused by the ProDOS bug, and another unrelated one caused by bad or weak power supplies.

LEAVE IT ON

Q. *I know it's not good to frequently turn on and off any computer, but what about the printer? If my Epson MX-80 won't be used again for maybe 30 minutes, should I leave it on or turn it off? What's the longest time it should be kept on?*

A. Any piece of equipment that contains semiconductor chips probably benefits from being left on. One of the causes of failure are stresses generated from heating and cooling, within the chip, between the chip and the chip package, and between the chip package and the printed circuit board. If the device is properly designed so that it doesn't overheat, I would recommend leaving it on for as long as you expect to use it, all day if desired. I turn my stuff off at night more to save electricity than anything else.

Heat and elevated temperatures are probably the worst enemies of semiconductor circuits. There is little you can do about this, chip temperatures are mostly a function of the design of the equipment. But, you can help by making sure that ventilation slots are not blocked by papers, books, or dust, that all fans are working, and there is sufficient space between equipment, walls, etc. for proper ventilation.

TAKE WARNING

Q. *Will damage occur to the computer if the hand-controllers or RF modulator are plugged-in or taken-out with the power on?*

A. No, not directly from plugging them in, but you must have little itty-bitty hands (certainly much smaller than mine) if you can reach in the Apple and plug in the controllers or the RF modulator without disturbing anything else. For example, just wiggling the disk controller card with the power on could blow chips. If you have the type of controllers that plug in the back of the Apple IIe, and you don't have to go inside, there is no problem.

RS232 devices like serial printers and modems can also be plugged-in and unplugged with the power on, but this is not true of all devices. Be particularly careful with disk drive cables. On some Apple models the connectors are similar to the RS232 connectors and people think they too can be disconnected and connected with the power on. *Do not disconnect or connect disk drives with the on*, doing so will also certainly damage the disk drive, the controller card, or both.

PULSE AND TOUCH-TONE

Q. *I hope to be getting a modem soon, but I only have a dial phone. What disadvantages are there to not having a Touch-Tone phone?*

A. None. Any modems I know of, and any that follow the Hayes command language, can work with pulse-dial or Touch-Tone lines.

TRY MAKING TWO BACK-UPS

Q. *I copied a disk on my Apple //c using either AppleWorks or the DOS 3.3 copy routine. The purpose of the copy was for backup. Since then my //c has not been able to read either the original or the copy. Clearly there is data on both because when I copy either the original or the 1st copy the procedure takes enough time, makes the sounds and displays the disk-in-use lights to indicate that a copy is being made. I have heard that there are programs that can recover lost data from disks or that there are people who know how to do this.*

A. I wish I could give you an easy answer, but there is no simple program that you can run to recover the information. First, AppleWorks uses the ProDOS operating system, so to copy a disk you should either do it from within AppleWorks or use the ProDOS System Utilities to copy a volume. The DOS

3.3 copy program will not copy the AppleWorks disk properly. Even if you did use the DOS 3.3 copy program there is no reason why the original disk should be damaged. Are all the files on the disk destroyed? Can you display a directory of the files on the disk? Possibly the files are okay but the directory information has been corrupted.

Boot your computer with the ProDOS System Utilities disk that came with your computer (or a copy of it) and exit to AppleSoft. From the left bracket prompt (]) type "CAT" (without the quotes) and see if the file names are reasonable. Format a blank disk and use the file copy utility to try to copy the individual files to the newly formatted disk. Some or all of your information may be recovered this way. If this is not possible, you can use a program that reads individual sectors on the disk, a so-called "Disk Zap" program, but you will also need extensive knowledge about the way ProDOS stores information on the disk. Skillman C. Kim Hunter wrote a good article, "Road Maps to Apple II Disks: DOS 3.3, CP/M, Pascal, and ProDOS", *Call -A.P.P.L.E., Vol. 8, No.2, February 1985*, that helps explain what goes where.

I know it sounds time consuming (and it's too late this time), but for really important files it is not too extreme to have an original and 2 backups. I spout this advice frequently, but I must admit that although I always make at least one backup I rarely make more than one. As you now realize, it is possible to destroy both the original and backup. Suppose there is something wrong with your program or computer that destroys the original data disk; you think you just can't read it. So you immediately stick in the backup which is also promptly destroyed. By this time, warning flags should pop up in your head before you destroy your second backup.

AN EXTRA CARRIAGE RETURN

Q. *With AppleWriter //e, I created a glossary definition Control-O, A, RETURN to catalog a disk. The definition properly presents the files, but skips by the first 16 files and displays files 17-39. Is it possible to create a definition that will display the first 18 files so that the contents of the entire disk can be reviewed?*

A. You appear to have stumbled on a small bug in AppleWriter IIe. As you know your glossary definition first calls up the DOS command menu with the Control-O. The "A" selects the catalog function, and the carriage return should be the response to the "Enter Slot,Drive (Example S6,D1) :" prompt. What appears to be happening is that an extra carriage return is being inserted so that the catalog listing does not pause after printing the first page of 18 files, but skips right on to the next page. You have probably also discovered that if you leave off the carriage return the definition ends with you sitting at the "Enter Slot..." prompt. I played around with this a little bit, and (horrors!) even read the manual, but I couldn't find a way around the problem. The next best solution is to leave the carriage return off the glossary definition and manually press return in response to the "Enter Slot..." prompt.

For those readers who may be wondering how to insert carriage returns into a glossary definition, you simply type the right bracket (]) to represent the carriage return.

A SHIFT KEY PROBLEM

Q. *I want to run AppleWorks using Plusworks on my Apple II. I have put the Autostart and AppleSoft ROMS into the machine to convert it to an Apple II+, but I don't know how to solve the shift key problem. It's a Revision 1 motherboard, with the outrigger on the keyboard, and I don't know how to do the hardware mod. Can you advise?*

A. With a little careful soldering it's not that hard to do. Turn your Apple over and remove the ten screws around the outside of the bottom of the case. Carefully turn it back over and lift the case up and simultaneously disconnect the cable from the keyboard where it plugs into the motherboard. Look at the keyboard printed circuit board where the two shift keys are soldered to it. You should see two small solder blobs for each key, and a printed circuit trace connecting together one solder blob from each key. Solder a thin wire to the other contact on either of the two keys, put the Apple back together, and stick the other end of the wire into pin 4 (pushbutton input 2) of the game I/O port. That's it. To test it, from AppleSoft, type PRINT PEEK(49251) and press return. Hold down the shift key when you press return and the number printed should be less than 128. If you don't hold down the shift key the number printed should be 128 or greater. If you accidentally get the wrong side of

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the shift key nothing will be damaged, the mod just won't work; then try the other contact.

THE 65816/65C02

Q. *I have been using the new mini-assembler and disassembler on the IIGS. It works like the one on the II, except that two bytes are generated for the break (BRK) instruction—even in 8 bit mode. Why?*

A. The IIGS uses a 65816 instead of a 65C02 microprocessor chip, which is used on the IIe and IIc. These chips obey a given set of commands called an "instruction set." Even though the 8 bit mode of the 65816 is supposed to be exactly like the 65C02, it really is not. On the 6502, a BRK will increment the program counter by one, store information and branch to the address stored in $FFFE and $FFFF. This helps in debugging. However, in both the native and emulation modes of the 65816, a BRK will increment the program counter by two, store information and then branches to a service routine. This allows you to place any code byte that you wish in the BRK instruction to assist you in your debugging efforts.

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THE DIFFERENT 3.5's

Q. *Apple is now selling several different types of 3.5" disk drives. Which can be used with each type of computer?*

A. The "UniDisk 3.5" was designed to work with the Apple II, IIe, and IIc. It included its own microprocessor. However, Apple took a different approach with the Macintosh's 800K external disk drive. That drive does not have its own microprocessor and all of its logical operations are handled in the main computer. The new drive is the "Apple 3.5" and is very similar to the "dumb" Mac external drive. As a result, the Apple 3.5 will work with the IIGS and the Mac, but will not attach to the control cards that were designed for the UniDisk 3.5. You can also use a UniDisk 3.5 on a IIGS.

You should note that the UniDisk 3.5 and Apple 3.5 disks may respond differently to various copy-protection schemes, and you should make sure to buy the correct control card for use with your disk drive. Also note that early IIc's require an upgrade to work correctly with the UniDisk 3.5 or Apple's new memory card.

A NEW MOTHERBOARD

Q. *Is Apple producing a new version of the motherboard for the IIe?*

A. Yes. The big difference to the user is that the famous "shift key" modification will be hard-wired into the machine. This means that all programs will be able to sense whether the shift key is pressed by sensing a game I/O switch. The new board will be less expensive to manufacture because it will use fewer but larger RAM chips to hold the 64K of RAM. The ROM remains unchanged, but will reside in one big chip instead of two.

THE LATEST PRODOS

Q. *What is the latest version of ProDOS?*

A. ProDOS 1.2 which has a date of 6-SEP-86.

TRACK 0 BUG

Q. *Does ProDOS 1.2 have the same track 0 bug which was discussed at the beginning of this column and in Open-Apple?*

A. Yes. *Open Apple* has modified the patch program to correct version 1.2. A corrected patch program for version 1.2 is reprinted below.

```
10  REM Stop ProDOS track 0
    crashing
20  REM patches by Stephen
    Thomas
30  REM MacLagan Wright &
    Associates
40  REM West Heidelberg, VIC
    Australia
100 TEXT : HOME : D$=CHR$(4) :
    E=0
110 VTAB 12 : PRINT "Now patch-
    ing ProDOS."
120 ONERR GOTO 500
130 IF PEEK(116)<96 THEN E=1 :
    GOTO 500 : REM Make sure
    there's room
140 PRINT D$;"UNLOCK PRODOS"
150 PRINT D$;"BLOAD PRO-
    DOS,a$2000,TSYS"
200 FOR ADR=22723 TO 22732
    STEP 3 : REM Change four
    STAs to LDAs
210 : IF PEEK(ADR)=189 THEN E=2
    : GOTO 500
220 : IF PEEK(ADR)<>157 THEN
    E=3 : GOTO 500
230 : POKE ADR,189
240 NEXT
300 ADR=20996 : V(0)=189 :
    V(1)=142 : V(2)=192 : REM
    Change NOPs to LDA
    $C008E,X
310 FOR I=0 TO 2
320 : IF PEEK(ADR+I)<>234 THEN
    E=3 : GOTO 500
330 : POKE ADR+I,V(I)
340 NEXT
400 PRINT D$;"BSAVE PRO-
    DOS,A$2000,TSYS"
410 PRINT : PRINT "Patches Com-
    pleted."
420 END
500 PRINT CHR$(7);"Error! No
    patches were made."
510 ON E GOTO 530,540,550
520 PRINT "PRODOS file not
    found." : END
530 PRINT "Not enough room to
    load PRODOS." : END
540 PRINT "File has already been
    patched." : END
550 PRINT "This version of ProDOS
    not 1.2"
```

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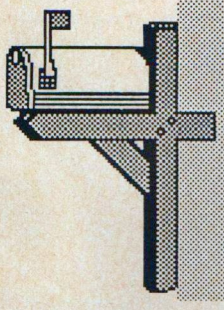
141 Excellent **142** Good
143 Fair **144** Poor



Write - A.P.P.L.E.

Readers' Forum

Comments & Fix

I would like to reply to some comments concerning my recent (September 1986) article in *Call A.P.P.L.E.* on the 65816 processor. It's a minor technical point, so be forewarned if you have a low boredom threshold. I also have a bug (and fix) to report for my ProDOS wedge program which was published in July's issue.

I read with interest, in November's issue (page 55), a letter quixotically entitled "Only Plain Vanilla" which dealt with my 65816 article. The author of the letter quite correctly pointed out that I used the Phrase "relocatable code" when I should have said "Position-independent". As he pointed out, almost any exceptions are confined to cases where the code is written in such a way that the opcodes or addresses in the program also serve as data. I have actually written such programs, and have lived to regret it.

The author then continues to make two incorrect criticisms of my position-independent subroutine call. A branch to subroutine can be simulated with the following two instructions:

```
PER     LABEL-1          ;push address to
                         return after
                         subroutine

BRL     SUBROUTINE;branch to the
                  subroutine, +/-
                  32768 bytes
LABEL
```

First, he claims that an interrupt occuring between the PER and the BRL will mess up the scheme. This is incorrect, as there is no stack information ever left below the stack pointer to get destroyed (as is the case with some older 6502 methods of writing relocatable code). Second, he claims that LABEL-1 is an absolute address, and therefore the above code is not relocatable. But PER (for Push Effective RELETIVE address) assembles to contain an offset, not an absolute address. The branch-to subroutine scheme works; I have tested it.

And now, my apology. I have recently discovered that my ProDOS diagnostic wedge program, described in last July's issue of *Call –A.P.P.L.E.*, does not work with the latest release of ProDOS. I had made the mistake of assuming that the secondary MLI entry point, within the ProDOS global page, would not move in later revisions of the operating system. Two bytes must be changed to make the ProDOS 8 version 1.2 wedge. The following instructions will patch the program:

```
BLOAD WEDGE, A$300
CALL—151
354: 4B
36B" 4B
3DOG
BSAVE WEDGE 1.2, A$300, L$85
```

Please note that the new wedge will not work with previous versions of ProDOS.

Sean Nolan

Manufacturing Defect

A popular far eastern super serial clone card was found to have a minor manufacturing defect that can prevent it from working with the ImageWriter II printer. The registor located just above the configuration jumper block may have one of its leads soldered into the wrong hole. This registor misplacement does not prevent the card from working with the older ImageWriter I or with most modems either.

This registor's forward lead should be soldered to the +12v trace, but on some of these cards, it is soldered to another pad about 1/4 inch. to the rear of the +12v trace. Carefully unsolder the lead, straighten it out and resolder it to the +12v trace just forward. There is little lead length to spare, in fact you may have to solder in a tiny extension or simply replace the registor with a new one. A1/4 will do, something in the range of 12K to 16K.

MarvWager

Working from Past Issues

I recently had the opportunity to use the program Provert.2 from the article "pfs: file to ProDOS ASCII Converter" by Wes Felty in your June 1986 issue to convert PFS files to ASCII files. I found the program very handy, but I also found a few problems in it that I thought I would pass along to you.

First of all, I found it necessary to do a file redesign under PFS (without actually changing the file design). This cleaned up my old PFS file and made all of the records and pointers sequential. When I tried converting the file without doing this, I got a bad POLE in the middle of the operation (in line 5050). Secondly, I found what I believe to be a few errors in the code which I will pass along. In line 5040, I believe the LO=B1-255 should be changed to LO=B1-256. In line 8040, I believe the end.-112*CY. After making these changes and doing a redesign on my file, I was able to use the Provert.2 program to successfully move a 226 record file over to AppleWorks.

Thank you Wes Felty!

Craig Peterson

Out of Stock

I have been a faithful reader of yours for many years (even contributed a few articles), and I hope that you or one of your readers could help me out. I have an old Apple II that I purchased in 1978, and as Apple owners will, have grown very fond of it despite its advancing age. Recently, the "1,2,3,4,7,8,;,-" keys quit working. This does tend to hamper doing much useful work, although as long as I can do a "6 CTRL P", I can still play "Choplifter". These keys all happen to be on the same matrix line going to the MM5740 keyboard decoder chip. Simply replace this chip, you say, which is my thought too, except this is the only chip in the Apple that is no longer made. My question therefore is —can anyone tell me where I can get one of these chips? My IIe and Mac all work great, but I have a soft spot in my heart for my old II.

Thanks in advance for any help,

Alan D. Floeter

Morris Horn & Associates (817) 292-3432, 3205 Denbury, FT Worth, TX 76133, may be your last resort for replacing those chips.

Revisions to Come

Watch for some corrections/revisions to the Copy Command for ProDOS (Feb.87) by Steven Ohmert.

THE MARKETPLACE

The following items are selected by our editorial staff from the large number of product announcements and news releases sent to us daily. They are presented solely to keep you informed about the current market for Apple related hardware and software. As we have not tested many of these products, appearance here does not necessarily represent endorsement or recommendation by **A.P.P.L.E. Co-op.** Further information about items appearing in **The Marketplace** can be obtained through the Reader Service Card. If you contact any manufacturer directly, please mention that you learned about them in **Call -A.P.P.L.E.**

ELECTRONIC NEWS

The National E-Mail Registry announces its toll-free national E-Mail registration service for business and personal users of electronic mail services. By calling (800) 622-0505 with a 300, 1200, or 2400, baud modem, callers can register their preferred E-Mail addresses in the electronic equivalent of the phone company "white pages."

National E-Mail Registry beats the key obstacle to electronic messaging-finding the favorite address of your E-Mail receiver. We help connect users of services like MCI-Mail or Telex to those of CompuServe, EasyLink, and even local BBS systems. Anyone with a modem can list his or her preferred E-Mail address in our online directory, free and toll-free.

National E-Mail Registry callers must specify their preferred E-Mail address, plus other information that allows the Registry service to uniquely identify them whenever they want to change their listings. On line registration takes about five minutes. Starting March 1, the "flip side" of The National E-Mail Registry begins operation. All registrants will be included in a searchable on line directory called The National E-Mail White Pages. White Pages calls will be received via modem at (203) 245-7720. Only those who have previously registered their own addresses can search for other E-Mail addresses in the White Pages.

Use of the White Pages is initially free to National E-Mail "registrants". Each new registrant gets 50 free searches through the National E-Mail White Pages. Thereafter, unlimited searching is available to high-volume E-Mail users for $95/year. Less frequent users with credit cards can buy "blocks" of 50 additional searches for $10–20 cents per search. The National E-Mail Registry and White Page services operate with eight incoming phone lines to avoid busy signals. For more information about The National E-Mail Registry or The National E-Mail White Pages, contact General Manager Ron Herff, (800) 843-6088, or send MCI Mail to RHERFF for a prompt reply.

The National E-Mail Registry, Three Neshaminy Interplex, Trevose, PA 19047. 800-843-6088..

CIRCLE **38** ON READER SERVICE CARD

APPLESOFT TO ZBASIC

AppleSoft to ZBasic reads an AppleSoft program file and creates an ASCII text file that can be read by ZBasic, making syntax changes where possible: Example: VTAB 10 : HTAB 25 is changed to LOCATE 24,9.

Line numbers are optional. Labels are created by putting double quote's around the old line number, that any GOTO or GOSUB points to.

There are some AppleSoft statements that have no corresponding ZBasic statement and where possible these statements are changed to ZBasic routines. All others are changed to REM statements.

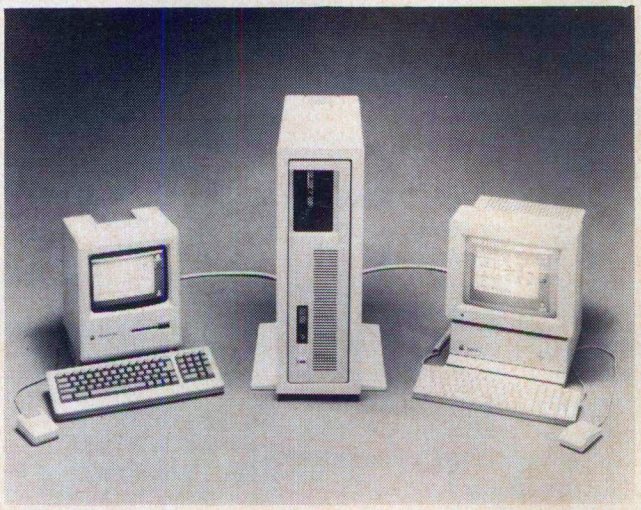
- Convert's Applesoft programs to ZBasic (including DOS statements).
- Conversion Approaches 98%
- Dramatically reduces conversion time.
- Add's DIM statements for all variables.
- Line number or Labels are optional.
- Converts any size program.

Price: $29.95 (includes postage and Handling). Ohio Residents Add $1.65 State tax.

Bringardner Data Products 1736 E. North Broadway, Columbus , Ohio, 43224-4364.

CIRCLE **39** ON READER SERVICE CARD

AN APPLE LINK



CMS Enhancements Inc., introduces the first hard disk subsystem to link Apple, Macintosh personal computers. CMS Enhancements announces the Data Exchange, a SCSI storage subsytem that links the Apple IIe and IIGS with the Macintosh Plus personal computer, enabling them to share files and exchange data.

The new subsystem consists of a SCSI hard disk drive featuring 320 Mbytes of mass storage and proprietary software developed by CMS that converts data developed on either the Macintosh or Apple machines. With Data Exchange, files developed in any Apple compatible software program are converted so that they can be used on the Macintosh, or vice versa. For example, data developed in AppleWorks, the leading word processing package for the Apple II personal computer family, would be converted to work with MacWrite. Because the new subsystem utilizes the Small Computer systems Interface (SCSI) protocol, it is approximately 20 times faster than the Appletalk local area network for the Apple personal computer family. According to Taylor, Data Exchange represents a major step forword in unifying the personal computer environment. The new subsystem is built around a SCSI hard disk drive featuring 320 Mbytes of mass storage, which stores files for all the personal computer systems. Multiple partitions are supported within the subsystem. The system supports one Macintosh and up to five Apple IIe/GS personal computers via the SCSI II interface card for a maximum of eight personal computers and peripherals. This subsystem has an average access time of 27ms. and a data transfer rate of 1.5 Mbytes per second. It utilizes 25 conductor SCSI cable. Up to 20 feet of cable can be used with each computer. Price: $7.995.00.

Contact Allen G. Taylor, *CMS Enhancements Inc., 3080- A Airway Ave., Costa Mesa, CA 92626, (714) 549-9111.*

CIRCLE **40** ON READER SERVICE CARD

A DEBUGGER

Stuart Enterprises introduces the BYTESTALKER machine language debug card for all Apple II series machines. This plug-

in card monitors data and address transactions directly on the busses of the microprocessor allowing the user to quickly and accurately debug and verify proper operation of application programs. Capabilities include real-time run, single step on each instruction, opcode fetch mode, and trap on specific addresses. This product is an excellent time saver for the professional and is also of great benefit for those learning or teaching assembly/machine language programming.

Unique hardware-based control makes this product extremely valuable for applications where extra memory space is not available for debug programs, or when real-time loop execution is necessary. The system is interrupt independent and can diagnose interrupt driven programs. The Bytestalker is absolutely transparent to the computer, and occupies no memory space.

The Bytestalker bus monitor card installs in any slot in the Apple II, II+, IIc or IIe enhanced machines. Data and address displays are edge mounted on the board for easy viewing by the operator. List price for the Bytestalker debug card: $88.50.

Stuart Enterprises, PO Box 310, Grass Valley, CA 95945. (916) 273-9188.

CIRCLE **41** ON READER SERVICE CARD

NEW TYPEFACE FOR DOT MATRIX PRINTERS

THE BLACK BOX NLQ Print Buffer will allow any Epson FX or RX printer with a Centronics interface to produce near letter quality type in a selection of typefaces—Courier, prestige, Elan, Italics or Roman.

Equipped with a 128K buffer that stores the graphic codes and can be used to hold up to 65 pages of text, this device is placed between the personal computer and printer. It receives standard data from the computer software and converts that (via self–contained software) data into a series of graphic instructions. Unlike other print upgraders, the device eliminates waiting and delays associated with software packages sold for this purpose. Price:$29.00

Black Box Corporation, P.O Box 12800, Pittsburgh, PA 15241, General Office: (412) 746-5500, Order dept: (412) 746-5530 or Technical Support: (412) 746-5565.

CIRCLE **42** ON READER SERVICE CARD

KIX FOR THE APPLE IIGS

Kyan Software Inc. has introduced a new version of KIX for the Apple IIgs. It is designed specifically for those who want to increase the power and ease of use of their IIgs with a Unidisk 3.5 for hard disk. KIX includes a Menu program and a family of 30 utilities for organizing and managing files and directories. After a simple installation procedure, KIX automatically boots when the hard disk is turned on. The Menu program which lists all programs stored on the disk is then displayed; to load and run one, the user simply scrolls down and selects it. When finished, s/he quits the application and returns to the KIX Menu.

KIX also contains a family of file management utilities. These routines allow the user to perform ProDOS-16 Filer operations without wading through a long series of menus. With batch file or simple command line instructions, the user can quickly copy, move, rename, or delete files; create, delete or list directories; format a disk; or copy a volume.

The UNIX like utilities actually expand the functionality of ProDOS. KIX users can merge multiple files; compare files and detect differences; print file or directory listings on the screen or a printer; search files for key words; search directories for filenames; read or write protect sensitive files; date-stamp files; (without a clock card) dump the contents of a screen to a printer; and much more.

KIX is fully compatible with AppleWorks and other ProDOS-8 or 16 software. It can be either disk or RAM resident and works with all hard disks. Price: $69.95.

Kyan Software, Inc., 1850 Union Street, #183, San Francisco, CA, 94123. (415) 626-2080.

CIRCLE **43** ON READER SERVICE CARD

COMPATIBLE GRADE BOOK

The ProDOS version of the J & S Grade Book is now compatible with the Apple computer. It takes advantage of both the speed and the use of the 3.5 inch disk drive. The grades of up to 1000 students can be saved on a 3.5 inch disk. All class data remains in computer memory no matter what option is chosen.

The speed is further enhanced by the rate in which data is read from the disk. Class grades are read from a disk at more than twice the speed as in using the same disk with the Apple IIe/c and five times as fast as the DOS 3.3 version with the Apple IIe/c.

Each class can handle up to 50 students and up to 55 grades per student. Grade book pages that replace the teacher's hand written grade book can easily be printed. Progress reports containing student grades, attitude comments, and other comments can easily be printed. Price:$39.50 or $49.50 with a backup.

J & S Software, 14 Vanderventer Ave., Port Washington, NY, 11050, (516) 944-9304

CIRCLE **44** ON READER SERVICE CARD

EXPAND IIc MEMORY

Checkmate Technology, Inc. announces the release of the MultiRam CX PLUS card MultiRam CX PLUS, Checkmate's newest addition to the MultiRam memory card series, will expand the Apple IIc memory to over 1 megabyte. The MultiRam CX PLUS is "piggyback" card which connects to the MultiRam CX, another Checkmate memory for the Apple IIc: it is compatible with all CX cards. The MultiRam CX PLUS card installs inside the IIc without altering any components; no soldering or disk drive removal is necessary. The use of CMOS circuitry reduces power consumption and heat build-up, and allows for a battery pack to be used with the IIc for lengthy sessions. The MultiRam CX PLUS is available in a 512K memory configuration with a suggested retail price of $244.95.

Checkmate Technology, Inc., 509 South Rockford Drive Tempe, Arizona 85281-ORDER DESK (800)325-7347, (602)966-5802.

CIRCLE **45** ON READER SERVICE CARD

BAR CODE READER

An Industrial grade bar code reader for the Apple IIgs was introduced at the MacWorld Exposition in San Francisco. The TPS Electronic PC-305 works on the ADB (AppleDesktop Bus keyboard/mouse circuit) used on the IIgs. The device allows the user to enter standard code 39 and UPC bar codes into the IIgs. The unit is campatible with any software because it simulates keyboard input. Applications for the unit include retail point–of–sale, videotape rental and inventory control.

The PC-305 retails for $795. The PC-305 is also available as a magnetic stripe reader (PC-505) and combination bar code/magnetic stripe reader (PC-3050). TPS Electronics also manufacturers a full line of bar code and magnetic stripe devices for the Macintosh, including the PC-380 which has been chosen by Apple Computer, Inc., for use on the Macintosh production line.

TPS Electronic 4047 Transport, Palo Alto, CA 94303,(415) 856-6833

CIRCLE **46** ON READER SERVICE CARD

CONJECTURE

Conjecture is a new game which is similar to a very popular television show Wheel of Fortune. The object is to solve a Phrase, Person, Place or Thing. Players take turns spinning the Wheel and guessing letters they think are in the puzzle. Suzi will saunter across the screen uncovering the letters as they occur in the

Puzzle, and points will be added to your score.

The first person to solve the Puzzle gets to keep their points for this round. Occasionally a "Challenge Round" occurs when each player races against the puzzle worth 5000 points. Conjecture is refreshingly different from other game software. It is as much fun to play with others as it is to play solo. It is easy to learn and to play, appealing to computer novices and experts alike. Conjecture gives you ultimate control, letting you configure the game the way you like it.

You can also modify the General File that is supplied or create your own puzzles Files. These feaures combine to make conjecture exciting, fun, and challenging. Price: $34.95.

Robert Scott Enterprises, P.O. BOX 1408, Auburn,WA 98071-1408. (206) 939-4105.

CIRCLE **47** ON READER SERVICE CARD

BOILERPLATING

Although *"Boilerplating"* is not a term often recognized in ordinary dictionaries, among computer users (especially those who use word processing programs) it has come to refer to the act of bringing prewritten segments of text (the "plates") together to form all or part of a document. In many writing situations, boilerplating can save time, preserve accuracy, and reduce the boredom that is often caused by repetitive tasks.

A. *WRITER'S BOILPLATER* is a system which offers great flexibility and ease of use. It enables the writer to assemble documents composed entirely of prewritten segments, or to insert segments at any locations in documents already loaded from disk or being composed at the keyboard. Its great expansion of AppleWriter's usual "macro" capability enables it to manipulate prewritten segments of virtually any length (limited only by available R.A.M). It is adaptable to a wide range of writing situations and tasks, and it will produce and print boilerplated documents of any length and in any number, handling much of the printing task itself, without user assistance. It does not require a ramdisk or frequent floppy disk access. And perhaps best of all, it offers clear documentation and a set of templates that will enable users to have their own boilerplating systems up and running in record time.

SYSTEM REQUIREMENTS: Apple IIe or IIc computer and AppleWriter In DOS 3.3 or ProDOS versions. Price: $19.50 plus $1.50 shipping and handling. *The Pleasant Valley Rt.2, Box 176, Eleva, WI 54738 (715) 287-4224.*

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A.P.P.L.E. CONSULTANTS
continued from pg. 9

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Multiplan	Richard Schubert	(716) 352-0837	(E)
Multiplan (India)	Pravin Bhambri	660060 ext. 607	
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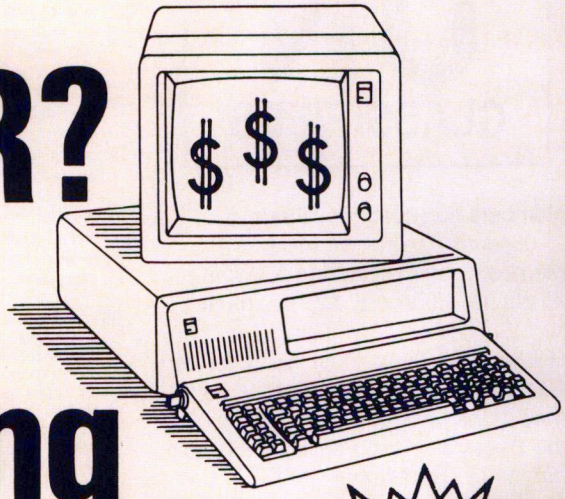

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MAGAZINE INDEX—an AppleWorks database indexing major articles and reviews for 1986. Cross-referenced by title, author, and subject. Magazines covered include: A+, BYTE, Call -A.P.P.L.E., Incider, InfoWorld, MacNews, MacTutor, MacUser, Nibble, Open-Apple, Personal Computing, II Computing. Two disk sides. Only $8.00 postpaid (money-back guarantee). Kula Software, 2118 Kula Street, Honolulu, HI 96817.

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